Madroño, Vol. 52, No. 4, pp. 222–257, 2005

SERPENTINE ENDEMISM IN THE CALIFORNIA FLORA: A DATABASE OF SERPENTINE AFFINITY

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Abstract

We present a summary of a database documenting levels of affinity to ultramafic ("serpentine") substrates for taxa in the California flora, USA. We constructed our database through an extensive literature search, expert opinion, field observations, and intensive use of accession records at key herbaria. We developed a semi-quantitative methodology for determining levels of serpentine affinity (strictly endemic, broadly endemic, strong "indicator", etc.) in the California flora. In this contribution, we provide a list of taxa having high affinity to ultramafic/serpentine substrates in California, and present information on rarity, geographic distribution, taxonomy, and lifeform. Of species endemic to California, 12.5% are restricted to ultramafic substrates. Most of these taxa come from a half-dozen plant families, and from only one or two genera within each family. The North Coast and Klamath Ranges support more serpentine endemics than the rest of the State combined. 15% of all plant taxa listed as threatened or endangered in California show some degree of association with ultramafic substrates. Information in our database should prove valuable to efforts in ecology, floristics, biosystematics, conservation, and land management.

Key Words: serpentine, ultramafic, California, endemism, diversity.

Introduction

Ultramafic rocks, often called "serpentine" by ecologists, botanists and pedologists, underlie more than 6000 km^2 of the land area of the State of California (Harrison et al. 2000). The edges of continental plates often include bands of these vestiges of oceanic mantle rock, accreted during the geologic process of subduction, and later uplifted and exposed during mountain building and subsequent erosion. Ultramafic rocks and the soils that develop on them are characterized by critically low levels of most principal plant nutrients (N, P, K, Ca), and exceptionally high levels of Mg and Fe and a suite of toxic trace elements including Cr, Ni, and Co. Outcrops of ultramafic rocks support high numbers of edaphic-endemic taxa throughout the world (Brooks 1987). The California serpentine flora is the richest in the temperate zone, and consists of hundreds of species and subspecies that are largely or entirely confined to ultramafic substrates.

Serpentine endemism is a key feature of the diversity of the California flora (Raven and Axelrod 1978; Kruckeberg 2002). Of about 1410 full species endemic to the State (Hickman 1993), Kruckeberg (1984) estimated that about 180 were endemic to serpentine. If these numbers are at least approximately correct, then about 13% of the plant species endemic to California are serpentine endemics. This is a remarkably high number when one considers that only 1.5% of the State is underlain by ultramafic rocks (6000 km^2/406,280 km^2). In addition, because they tend to have small geographic ranges and because many of them occur in the rapidly urbanizing San Francisco Bay Area, serpentine endemics are overrepresented among the state's rare, sensitive, and listed plant taxa (Skinner and Pavlik 1994). The ecology of California's serpentine plants has been extensively studied at the University of California's Sedgwick Ranch Reserve (e.g., Seabloom et al. 2003; Gram et al. 2004) and McLaughlin Reserve (e.g., Harrison et al. 2003; Safford and Harrison 2004) and Stanford University's Jasper Ridge Reserve (e.g., McNaughton 1968; Huenneke et al. 1990; Hobbs and Mooney 1991).

Botanists have relied for two decades on the monograph by Arthur Kruckeberg (1984) for most of their information on Californian serpentine-endemic plant taxa. Since then, publication of the Jepson Manual (Hickman 1993), and a proliferation of new botanical research and name changes have left this list in need of updating. Our initial aim was to modify Kruckeberg's (1984) list, primarily using information from Hickman (1993), to use in our research on diversity patterns (Harrison et al. 2000, 2004). However, it soon became clear that we would have to expand and intensify our search for the best available information. Complicating this effort, plants show a continuum in degrees of serpentine restriction, and are sometimes more restrict-

ed in some parts of their geographic ranges than others, thus contributing to inconsistencies among reports from different sources. This led us to adopt a semi-quantitative procedure for scoring plant taxa on their reported degree of serpentine affinity.

In this contribution, we present a summary of our current database of serpentine affinity in the California flora. The database was constructed via an extensive literature search, expert opinion, field observations, web research, and intensive use of accession records at key herbaria. It provides data on levels of serpentine endemism, rarity, geographic distribution, taxonomy, and lifeform.

Methodology

We began by conducting a database search of the electronic Jepson Manual (Hickman 1993) maintained by the Jepson Herbarium at the University of California-Berkeley (UC-JEPS 2004a). The database was queried for all taxa with "serpentine", "ultramafic", or related (e.g., "asbestos soils") references in the habitat description. Taxa containing "non-serpentine" in the description were removed afterward. We cross-checked the 391 serpentine-related taxa found in the Jepson Manual with Kruckeberg (1984), who listed those taxa he believed to be endemic to ultramafic substrates in California, and those that were either local or regional "serpentine indicators" (i.e., nonendemic taxa whose distributions are nonetheless skewed toward occurrences on ultramafics). Taxonomic updates in the Jepson Manual (Hickman 1993) were applied to the Kruckeberg list (which included 377 taxa after these revisions), and then those taxa not on the Jepson-derived list were added to our database. This resulted in a list of 529 taxa; of these, 287 were not shared between the two sources. We then added to the list a number of taxa that we considered to be likely endemics or indicators but which were not indicated as such by either Kruckeberg (1984) or the Jepson Manual (1993). Finally, published literature (e.g., Meinke and Zika 1992; Nelson and Nelson 2004; Baldwin 1999 and 2001; Barkley 1999; Porter and Johnson 2000; Zika et al. 1998) and the online Jepson Interchange Jepson Flora Project (UC-JEPS 2004b) were consulted for taxonomic revisions and taxa newly described since the publication of the Jepson Manual.

To score the affinity of taxa to ultramafic substrates, we adopted a modification of Kruckeberg's measures of ultramafic "fidelity". In his Appendix C, Kruckeberg (1984) used two or three "+"s to signify increasing levels of endemism: three "+"s were attached to taxa with 95–100% of their occurrences found on ultramafics, two "+"s signified taxa with 85–94% fidelity. In his Appendix D, Kruckeberg used one or two exclamation marks ("!"s) to signify increasing levels of fidelity to ultramafic substrates among supposed nonendemic "indicator" taxa. In both appendices, question marks ("?") were attached to those taxa for which more information was necessary to confidently assign their status. Some of the "tentative" endemics were included in the indicator appendix as well, thus these taxa occur twice in Kruckeberg's lists. We combined Kruckeberg's two scales, and added two levels to yield six levels of ultramafic affinity, where 6 represents a "strict endemic" (≥95% of occurrences on ultramafics), and successively lower values signify lower affinity to the substrate (5 = 85–94% of occurrences; 4 = 75–84%; 3 = 65–74%; 2 = 55–64%; 1 = 45–54%). By this definition, "1" thus represents a species found about half of the time on serpentine. We consider scores between 1 and 2 to indicate "weak indicators", and a score of about 1 to mean an "indifferent" taxon. The Kruckeberg fidelity scale crosswalks to ours in the following fashion: "+++" = 6; "++" = 5; "!!" = 3; one "!" = 2. Those taxa which occurred in both Kruckeberg's endemic and indicator tables had their two scores averaged: these all fell between "3" and "4" on our scale. For example, *Cupressus macnabiana* was rated "+++" in Kruckeberg's Appendix C (i.e., "6" on our scale), and "!!" [i.e., "2" in our scale] in Appendix D; these were averaged to "4" on our scale.

We attached our categorical levels of ultramafic affinity to all of the species in our hybrid Jepson-Kruckeberg database. In the case of the Kruckeberg taxa, we simply cross-walked the Kruckeberg fidelity codes to our scale as described above, making some adjustments based on more recent taxonomic revisions and combinations. In the case of the Jepson Manual taxa, we were forced to interpret the language used in habitat descriptions to determine levels of affinity. We used the following interpretations of description language to assign affinities: a "6" was assigned where the habitat description categorically stated "serpentine" or "ultramafic" (a "5" if there was some indication that this restriction was not absolute); a "4" was assigned where the modifiers "generally" or "usually serpentine" were used; "especially" or "often" equaled "3"; "sometimes" or "occasionally" equaled "1". In a few cases, affinity levels were assigned based on ancillary information in the habitat and/or range description rather than on explicit statement of serpentine affinity.

We then conducted a broad survey of the literature, regional botanical experts, and herbaria records to obtain as many sources as possible for each taxon in our database, and to add to the database any taxa we might have overlooked. We manually consulted every species description in a variety of regional and local floras (Clifton 2001; Ertter and Bowerman 2004; Howell 1970; McMinn 1939; Oswald 2002; Smith and Wheeler 1992), and guidebooks to rare and sensitive taxa (Hanson 1999; Hoover et al. 1993; Jimerson et al. 1995; McCarten 1988; McCarten and Rogers 1991; Nakamura and Nelson 2001; Trinity SIPS 2001; USFWS 1998).

We also consulted the CalFlora Online Species Database (CalFlora 2004), and the California Native Plant Society Online Inventory of Rare and Endangered Plants (CNPS 2004). We added columns to our database for each source, and gave scores (1–6, as described above) to each taxon for which a habitat description suggested an ultramafic affinity. Information on serpentine affinity in the CalFlora database is limited to taxa from the Sierra Nevada and to rare taxa statewide, and does not include sufficient information to determine degree of affinity (A. Dennis, personal communication). CalFlora was therefore not treated as a typical "source", and CalFlora serpentine taxa were simply given a score of 0.5 to be added later to the sum of scores when final ultramafic affinities were calculated (see below). The California Natural Diversity Database (CNDDB) was not searched, as we consulted all of the primary resources originally used to build CNDDB, and the CNPS Online Inventory (see above) is updated from the same contemporary sources as CNDDB.

We calculated preliminary mean affinities for taxa in our database by summing the scores across source columns and adding the CalFlora score (if present), then dividing by the number of sources (not including CalFlora) for the taxon in question. We also calculated the number of sources, the median score, and the standard deviation and standard error of the scores for each taxon. We then sent the database to approximately 40 state and regional experts for their review and input, and asked them to score serpentine affinity using the 1–6 scale for taxa with which they were familiar. These individuals included botanists employed by federal and state land management agencies, universities, museums, non-governmental organizations, and private consulting firms. We received 17 substantive replies, and incorporated their input into an updated database.

The next step was to ensure that we had at least three sources of serpentine affinity for each taxon in our database; given the great differences between the Jepson Manual and Kruckeberg's list, we felt a third opinion was important. We focused on those taxa for which we had less than three sources, as well as those with high variability in scores. We began by consulting the habitat descriptions in Munz and Keck (1968) for every taxon in our database with less than three sources. We then turned to Herbaria accession records. We searched the online "SMASCH" accession databases of the UC and Jepson Herbariums at UC-Berkeley at (UC-JEPS 2004c) for all taxa with one or two sources, and for all taxa with affinity-score standard deviations ≥ 1.0 (a total of 548 taxa). For any Northern California taxa remaining with less than three sources and/or high variability, we then searched the online accession database of the Biological Sciences Herbarium at Chico State University (CSU-BSH 2004; a total of 164 taxa were searched).

In our online accession database research, we followed the following protocol:

1. We began with the most recent accession records and worked backwards, as habitat descriptions before the mid 1970's usually lack sufficiently detailed information on substrate and location.

2. We consulted the habitat description for each record. If the description included enough information to determine the substrate, we noted whether it was ultramafic or non-ultramafic. We did not count multiple accession records from the same collecting trip and location as different records.

3. On the average, about ⅓ of the accession records consulted had sufficient information to determine if a collection had been made on ultramafics or not. Not all of these determinations were made simply based on the collector's habitat description. For example, many California counties do not contain outcrops of ultramafic rocks (e.g., Los Angeles, San Diego, San Bernardino, Modoc). Collections from these counties were coded as "nonserpentine" even where habitat descriptions were missing. Also, collections from well-known collecting locations on ultramafics (e.g., Blue Banks in Glenn County, Red Butte in Siskiyou County, or the mouth of 18-Mile Creek on the Middle Fork Smith River, Del Norte County) were coded as "serpentine" even where habitat descriptions were missing. Finally, where we had trouble getting a sufficient number of records with habitat descriptions, or where it was otherwise critical to get more information, we used location information in the accession record (where it existed) to do further research. We used TOPO! Software (National Geographic Maps 2000) to locate coordinates or named locations and then consulted geological maps (ranging from 1:250,000 to 1:25,000) to determine if the location was on an ultramafic outcrop. Only those occurrences which could be confidently assigned to ultramafics were identified as such.

4. We continued until we had recorded habitat information from at least 10% of the total accession records for the species in question. Our minimum was 10 records, unless there were fewer than 10 records with habitat descriptions and reasonably locatable site information (286/548 taxa had fewer than 10). Our maximum was usually 20, although we went beyond 20 in some cases.

5. We summarized the accession record results for each taxon by dividing the total number of records with sufficient habitat or location information to determine substrate by the number of records recording serpentine/ultramafics, and then multiplied the result by 100 to get a percentage. We then cross-walked the percent value to our scale of ultramafic affinity: 95–100% of records on ultramafics = 6; 85–94% = 5; 75–84% = 4; 65–74% = 3; 55–64% = 2; 45–54% = 1; 35–44% = 0.75; 25–34% = 0.5; 15–24% = 0.25; >0–14% = 0.1; 0 = 0.

Finally, T. Nelson and S. Carothers also used the

Humboldt State University Herbarium to provide information to us on a number of under-documented taxa from Northwestern California.

In our accession records research, we necessarily assumed that: (1) the taxon itself was correctly identified on the accession record; (2) the substrate was correctly identified by the collector; and (3) ultramafic substrates were neither more nor less likely to be identified correctly (or at all) than other substrates. The last assumption is probably flawed, as serpentine and other "charismatic" substrates—given their close connection to plant endemic taxa and their relative ease of identification—are almost certainly more likely to be identified than "normal" substrates. This could theoretically lead to accession records "overstating" the degree of a taxon's affinity to ultramafic substrates. In practice, however, we found that the accession records were generally somewhat more conservative than our literature sources vis-à-vis the serpentine affinities of the taxa in our database.

Our final database included 18 columns of information sources for serpentine affinity, plus a column for CalFlora. We summed these affinity values and took their mean (not including CalFlora in the denominator). We also calculated the mean without CalFlora, the median, the standard deviation, and the standard error. We identified each taxon by taxonomic category (pteridophyte, gymnosperm, dicot or monocot), and by lifeform (annual forb, perennial forb, annual graminoid, perennial graminoid, shrub, tree). For rare taxa, we added the rarity rating from the California Native Plant Society Online Database of Rare and Endangered Plants (version 6.04d, 11-12-2004). The following information was also added to the complete database: geographic distribution in California for each taxon (by Jepson Manual geographic subdivisions); elevational range (from Hickman 1993); the geographic distribution of, and number of species of the genus of each taxon (from Mabberly 1996); and the common name (from Hickman 1993, and the Natural Resource Conservation Service PLANTS online database [USDA-NRCS 2005]). Aside from a summary of the geographic distribution, this information is not presented in the current paper, but is available on request from the first author, as are the affinity values calculated for each source.

Results

A summary table of the current database is presented in Appendix 1. Appendix 1 includes 669 taxa, ranging in affinity from 6.25 to 1.00 (some values exceed 6 because they were identified as serpentine taxa in the CalFlora Database). Our full database includes 698 taxa, 29 of which have mean serpentine affinities of < 1; we did not include these taxa in the current paper. The greatest number of sources we located for any single taxon was nine (four taxa). We found eight sources for eight taxa and seven sources for 19 taxa; 587 taxa had between three and six sources. Eighty-one taxa had fewer than three sources (77 with two, three with one). Somewhat more than half of the taxa (387) in our original list had standard deviations for serpentine affinities > 1.0.

Since our serpentine affinities are calculated as the means of multiple sources, our values fall on a continuous scale, rather than in categories. Given this, we recognized taxa with mean affinities > 5.5 as "strict endemics" (analogous to Kruckeberg's "+++", or taxa with $> 95\%$ of their occurrences on ultramafics), and taxa with mean affinities > 4.5 and < 5.5 as "broad endemics" (analogous to Kruckeberg's "++", taxa with about 85–94% of their occurrences on ultramafics). Using these definitions, 164 taxa are strict endemics, while 82 taxa are broad endemics, for a total of 246 endemic taxa; 176 of these are full species. Among the remaining taxa, 123 are "strong serpentine indicators" (Kruckeberg 1984), with scores ranging from 2.5 to 3.4 (about 65–74% of their occurrences on ultramafics); 150 are "weak indicators", falling between 1.5 and 2.4 on our scale ($\pm$ 55–64% of their occurrences on ultramafics); and 79 fall in a gray area between weak indicators and indifferent taxa (between 1.0 and 1.4 on our scale, or about 50–54% of occurrences. Seventy-one taxa have affinity scores between 3.5 and 4.4 (about 75–84% of their occurrences on ultramafics), and thus represent the transition from strong indicators to broad endemics.

Six families account for more than half of all the endemics: Asteraceae, Liliaceae, Brassicaceae, Polygonaceae, Scrophulariaceae, and Apiaceae (Table 1). The 20 most important plant families among the serpentine endemics are shown in Fig. 1, with the percentage of the serpentine endemic flora that they contribute, as well as the percentage of the total California endemic flora that they contribute. Families that proportionally contribute more to the serpentine endemic flora than to the California endemic flora include Liliaceae, Brassicaceae, Polygonaceae, Linaceae and Caryophyllaceae. Families whose level of endemism is much lower on serpentine than it is statewide include Fabaceae, Poaceae, Boraginaceae, and Rosaceae (Fig. 1).

The most diverse genera in our list of serpentine endemics are *Streptanthus* (Brassicaceae) and *Eriogonum* (Polygonaceae), followed by *Hesperolinon* (Linaceae) and *Arctostaphylos* (Ericaceae) (Table 2). There are 21 genera with at least four taxa among the endemics. These represent 14 plant families, with Asteraceae (four genera among the endemics), Liliaceae (three genera), Scrophulariaceae (two genera) and Brassicaceae (two genera) the only families with multiple genera in the list. Figure 2 compares the contribution of these genera to the serpentine endemic flora with their contribution to the California endemic flora. All but five or six of these genera have a greater level of endemism to serpentine than they have within the State as a

Table 1. Numbers of Serpentine Endemic and Near Endemic Taxa, by Family. [1] Strict endemics. [2] Strict endemics plus broad endemics. [3] Strict and broad endemics plus "near endemic" taxa (taxa transitional from strong indicators to broad endemics).

Family	Serpentine affinity score ≥5.5[1]	≥4.5[2]	≥3.5[3]	Total taxa
Asteraceae	26	37	45	106
Liliaceae	15	28	37	85
Brassicaceae	21	26	31	46
Polygonaceae	10	17	19	39
Scrophulariaceae	9	14	18	37
Apiaceae	7	10	13	32
Linaceae	8	9	9	14
Ericaceae	5	8	10	15
Polemoniaceae	6	7	8	18
Caryophyllaceae	5	7	8	18
Fabaceae	4	7	10	24
Lamiaceae	4	6	10	17
Crassulaceae	5	5	7	13
Rhamnaceae	4	5	6	14
Campanulaceae	3	5	8	12
Onagraceae	3	5	7	12
Hydrophyllaceae	4	4	8	15
Rubiaceae	3	4	4	8
Convolvulaceae	1	4	5	6
Cyperaceae	1	4	5	8
Poaceae	1	3	3	19
Portulacaceae	0	3	5	16
Boraginaceae	2	2	3	10
Gentianaceae	2	2	2	3
Iridaceae	2	2	2	4
Malvaceae	2	2	2	5
Salicaceae	2	2	2	3
Garryaceae	1	2	2	2
Rosaceae	1	2	5	10
Cupressaceae	0	2	3	6
Violaceae	0	2	3	7
Asclepiadaceae	1	1	1	1
Berberidaceae	1	1	1	4
Dryopteridaceae	1	1	1	2
Fagaceae	1	1	1	3
Lentibulariaceae	1	1	1	1
Papaveraceae	1	1	1	5
Ranunculaceae	1	1	3	6
Orchidaceae	0	1	1	3
Pteridaceae	0	1	1	4
Verbenaceae	0	1	1	1
Cistaceae	0	0	0	1
Orobanchaceae	0	0	0	1
Pinaceae	0	0	1	6
Plantaginaceae	0	0	0	1
Polygalaceae	0	0	0	1
Primulaceae	0	0	0	1
Sarraceniaceae	0	0	1	1
Saxifragaceae	0	0	1	2
Sterculiaceae	0	0	0	1
Totals	164	246	315	669

whole. These genera include *Streptanthus, Hesperolinon, Lomatium* and *Minuartia.* Only one genus (*Phacelia*) contributes less to the serpentine endemic flora than it does to the State as a whole; *Arctostaphylos* contributes a similar percentage to both floras (Fig. 2).

Of the taxa in our database, there are 532 dicots (of which 204 are endemic), 119 monocots (38 endemics), 12 gymnosperms (2 endemics) and six pteridophytes (2 endemics). 207 taxa are annual forbs (of which 71 are endemics, including 7 of 14 that can also be perennial/biennial), 383 are perennial forbs (150 endemics, including the 7 "annuals" and 6 taxa which can also be shrubs), 24 are perennial graminoids (7 endemics), 64 are shrubs (23 endemics, including 6 taxa shared with the perennial forbs and 1 which assumes both tree and shrub forms), and 12 are trees (2 endemics) (Appendix 1). Of the endemic perennial forbs, 24 are bulb plants (all Liliaceae), 17 are rhizomatous (from ten different Families), three are hemiparasites (Scrophulariaceae), and one is carnivorous (Lentibulariaceae) (Appendix 1).

Using Kruckeberg's (1984) physiographic provinces of California (which correspond more or less to major geographic subdivisions mapped in the Jepson Manual (Hickman 1993)), we found the following geographic distribution of serpentine endemic taxa (Fig. 3): The North Coast, considered *in toto* (i.e., the Jepson Manual's NCo and NCoR subregions (Hickman 1993)), supports approximately 118 serpentine endemics, with 49 of these restricted to that area. The Klamath Region (Jepson Manual subregion KR), supports 98 endemic taxa, with 54 restricted to that area (including taxa also found in neighboring SW Oregon). The San Francisco Bay Area (Jepson Manual subregion SnFrB plus the sections of NCo and CCo bordering it) supports about 51 endemics, with 24 found only there. The South Coast Ranges, including the Channel Islands and the Santa Ana Mountains (i.e., Jepson Manual subregions CCo, SCoR plus the few ultramafic outcrops that occur in the Jepson SW Region), support 43 total endemics with 24 restricted to that area. The Sierra Nevada (Jepson Manual region SN) support 38 total serpentine endemic taxa, with 21 taxa restricted to the Range (Fig. 3).

Of the 669 taxa in our database, 295 are listed as "rare" or "uncommon" by the California Native Plant Society (CNPS) (Appendix 1). These include 194 of the 246 taxa that we consider to be either strict or broad serpentine endemics. One serpentine endemic taxon, *Arctostaphylos hookeri* subsp. *franciscana,* is extinct in the wild and survives only in cultivation. Of the 295 rare or uncommon taxa, 154 are on CNPS List 1b, which lists plants considered threatened or endangered by either the State or Federal governments, as well as unlisted plants which CNPS considers rare enough to warrant listing; 111 of these List 1b plants are serpentine endemics by our definition. Nine taxa (seven endemics) from Appendix 1 are on CNPS list 2, which contains plant taxa that are rare in California but are not restricted completely to the State; all of these taxa are either State listed and threatened or endangered,

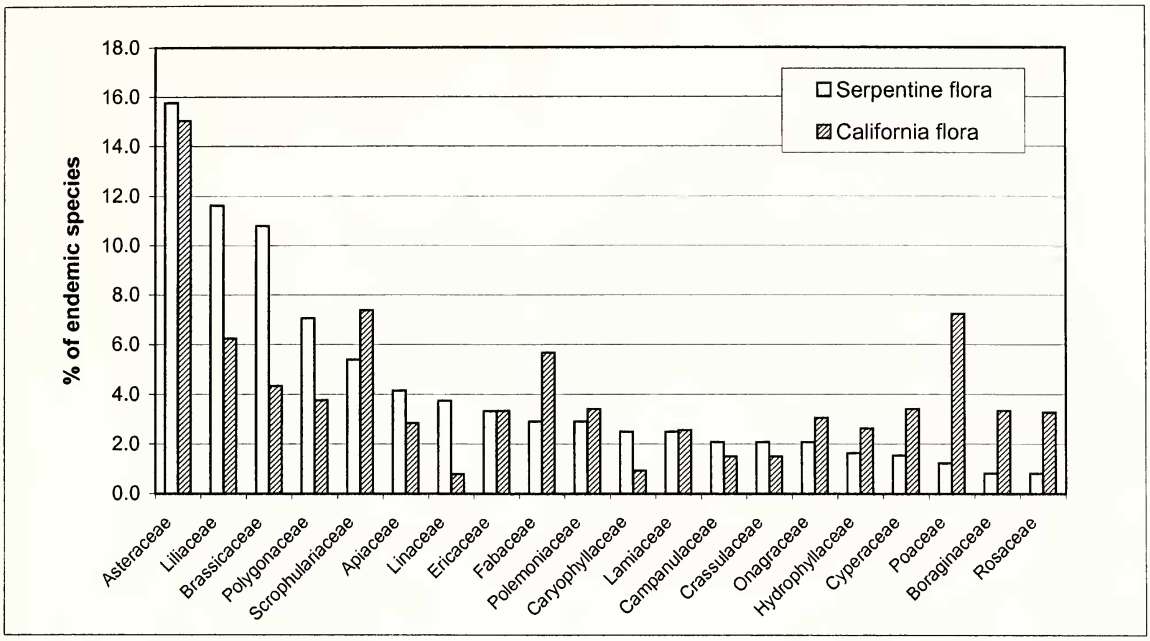

FIG. 1. The twenty most important plant families of serpentine endemic plants (i.e., including strict and broad serpentine endemics), with the percentage of endemic species they contribute to the serpentine endemic flora in California, and to the California endemic flora as a whole.

or are eligible for listing. Eight taxa (four endemics) in Appendix 1 are found on CNPS list 3, which lists uncommon taxa for which more information is required. Of taxa in Appendix 1, 123 (71 endemics) are on CNPS list 4, which contains taxa of "limited distribution or infrequent throughout a broader area in California".

TABLE 2. GENERA WITH MORE THAN THREE TAXA ENDEMIC TO SERPENTINE.

Genus	Family	Endemic taxa
Streptanthus	Brassicaceae	18
Eriogonum	Polygonaceae	14
Hesperolinon	Linaceae	9
Arctostaphylos	Ericaceae	8
Allium	Liliaceae	7
Lomatium	Apiaceae	7
Packera (*Senecio*)	Asteraceae	6
Calochortus	Liliaceae	5
Cordylanthus	Scrophulariaceae	5
Arabis	Brassicaceae	4
Calystegia	Convolvulaceae	4
Carex	Cyperaceae	4
Castilleja	Scrophulariaceae	4
Cirsium	Asteraceae	4
Erigeron	Asteraceae	4
Fritillaria	Liliaceae	4
Galium	Rubiaceae	4
Lessingia	Asteraceae	4
Minuartia	Caryophyllaceae	4
Monardella	Lamiaceae	4
Phacelia	Hydrophyllaceae	4

DISCUSSION

In 1984, Kruckeberg estimated that the serpentine endemic flora of California numbered approximately 220 taxa (about 180 full species), and that a further 230 taxa were sufficiently associated with ultramafics to be "indicators" of the substrate. Thus, Kruckeberg believed that about 450 taxa were associated with serpentine in California. Although our results suggest that the number of serpentine-associated taxa is closer to 670, they also suggest that Kruckeberg's (1984) estimate of the number of full-species endemics was remarkably accurate (180 vs. 176). As Kruckeberg's numbers also suggested, serpentine endemics therefore comprise approximately 12.5% (176/1410) of the plant species endemic to California. Based on numbers from the Jepson Manual (Hickman 1993; R. Moe personal communication), the percentage of serpentine endemics among California endemic species, subspecies and varieties is about 11.4% (246/2153).

Kruckeberg's (1984) estimates of endemics by California geographic region are somewhat less accurate than his statewide estimate (see Fig. 3), but Kruckeberg's data sources in the 1970's and early 1980's were extremely limited compared to ours. As did Kruckeberg, we found that the North Coast Ranges support more serpentine endemics plants than any other geographic region, but that the Klamath Ranges (and adjoining SW Oregon) support many more restricted endemics than Kruckeberg thought was the case (54 vs. 30). Kruckeberg's estimates for the numbers of restricted endemics in

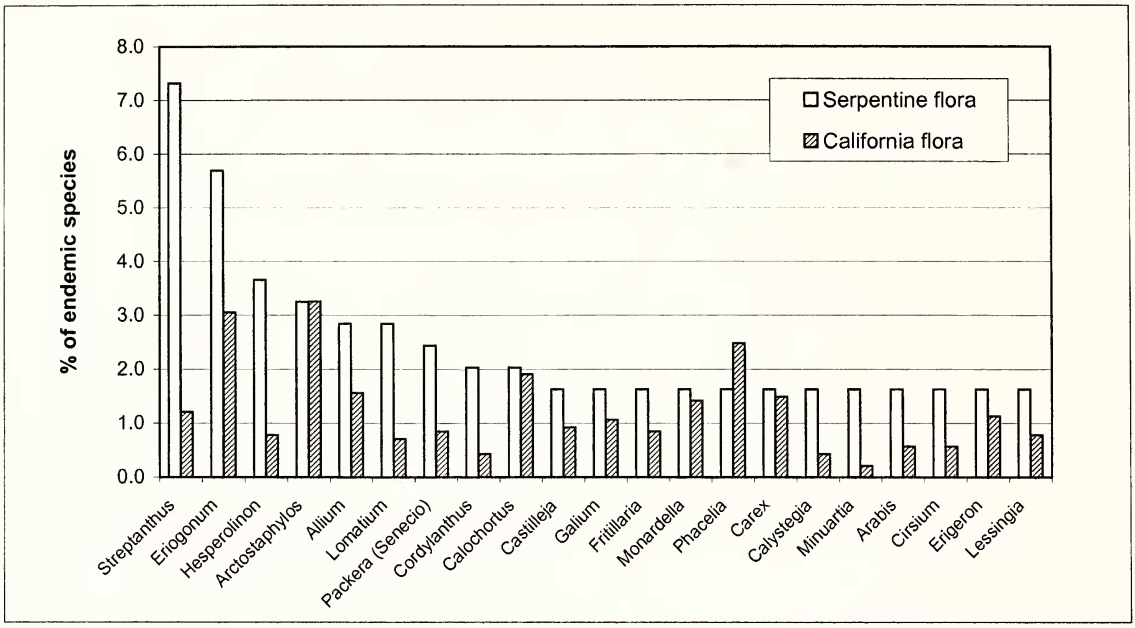

FIG. 2. The twenty-one most important genera of serpentine endemic plants (i.e., including strict and broad serpentine endemics), with the percentage of endemic species they contribute to the serpentine endemic flora in California, and to the California endemic flora as a whole.

the North Coast Ranges and the Bay Area are very similar to our numbers (Fig. 3), but he overestimated the number of endemics in the South Coast Ranges (36 vs. 24). Kruckeberg estimated that either 13 or 16 (depending on whether one goes by the text or the tables in Appendix E) endemic taxa were restricted to the Sierra Nevada; we found 21 taxa thus restricted.

Reasons for differences between our numbers and Kruckeberg's (1984) are many, but belong to two broad categories. The primary reason is quality and quantity of information. In many cases, Kruckeberg's information had to come through his own field experience, or through hard copy herbarium records, which—before the late 1970's—were notoriously uninformative when it came to habitat description. In contrast, many data sources we accessed were available electronically and could be queried and retrieved remotely.

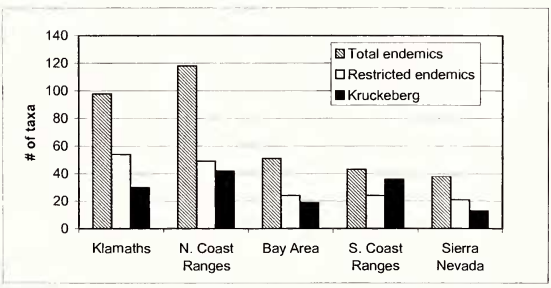

FIG. 3. Geographic distribution of serpentine endemic taxa in California. "Total endemics" includes all California serpentine endemic taxa present in a given region; "restricted endemics" includes only those taxa restricted to a given region; black bars represent Kruckeberg's (1984) estimates of restricted endemics.

The other principal reason for difference is the inevitable discoveries and taxonomic reorganizations that occur over a 20-year period. Kruckeberg's work came before publication of the Jepson Manual (Hickman 1993), which contained many significant changes in California plant taxonomy. A considerable number of serpentine endemic taxa in the Jepson Manual were wholly unknown to Kruckeberg in 1984. Examples include *Calochortus raichei* S. Farwig & V. Girard, *Minuartia stolonifera* T. W. Nelson & J. P. Nelson, *Perideridia bacigalupii* Chuang & Constance, and *Monardella stebbinsii* Hardham & J. Bartel. Since the Manual's publication, there have been further changes (e.g., Barkley 1999; Baldwin 1999; Porter and Johnson 2000). Serpentine endemic taxa named since publication of the Jepson Manual include *Harmonia guggolziorum* B. G. Baldwin, *Carex serpentinicola* P. F. Zika, and *Silene serpentinicola* T. W. Nelson & J. P. Nelson.

As a null hypothesis, one might expect that the distribution of endemic plant taxa across plant families and genera on California serpentines would more or less mirror the distribution of endemics in the State as a whole. Our data demonstrate that this assumption is incorrect at both taxonomic levels, but the root of this difference seems to be largely at the level of genus. A number of families contribute a much higher proportion of the serpentine

TABLE 3. EXAMPLES OF "REGIONAL" SERPENTINE INDICATORS, *SENSU* KRUCKEBERG (1984). [1] CA = California, KL = Klamath Ranges, NC = North Coast Ranges, BA = San Francisco Bay Area, SC = South Coast Ranges, SN = Sierra Nevada.

Taxon	Distribution[1]	Comments[1]
Allium amplectens	CA	SC—broad endemic; Northern CA—weak indicator at best
Aspidotis densa	CA	Marin County—broad endemic; rest of NC—weak to strong indicator; KL—broad endemic to strong indicator, depending on locality; rest of CA—strong indicator
Festuca californica	CA	Northern SN and KL—strong indicator to broad endemic; NC—primarily weak indicator; rest of CA—indifferent
Lupinus onustus	KL, SN	KL—broad endemic; SN—indifferent (mostly non-ultramafic)
Pinus attenuata	CA	Mendocino County and neighboring NC—broad endemic; rest of NC and SC—strong indicator; KL—weak indicator; SN—weak indicator to indifferent
Pinus jeffreyi	KL, NC, SC, SN	KL and NC—± strict endemic; Westslope of northern SN—strong indicator; rest of CA—indifferent
Quercus vaccinifolia	KL, NC, SN	Mendocino County and neighboring NC—broad endemic; Northern NC and KL—weak indicator; SN—indifferent
Sedum obtusatum ssp. *obtusatum*	KL, SN	KL and NC—± broad endemic; SN—weak indicator or indifferent
Stachys pycnantha	CA	Marin County—broad endemic to strong indicator; Northern SN—very weak indicator; rest of CA—weak indicator or indifferent
Viola douglasii	CA	Plumas County—endemic; NC—strong indicator; rest of CA—indifferent

endemic flora than they do of the California endemic flora (Fig. 1), but our database shows that most of these "anomalies" are due to one or two genera within those families (see Fig. 2). Examples include *Fritillaria* and *Allium* in Liliaceae, *Minuartia* in Caryophyllaceae, *Streptanthus* and *Arabis* in Brassicaceae, *Hesperolinon* in Linaceae, and *Eriogonum* in Polygonaceae. Many of these genera are well-known as foci of neoendemism (i.e., genera with groups of actively and rapidly speciating taxa) (Raven and Axelrod 1978). It is interesting that such prominent California plant families like Scrophulariaceae, Hydrophyllaceae, Boraginaceae, Onagraceae and Polemoniaceae are underrepresented on serpentine substrates. Certain highly diverse genera in California are also proportionally underrepresented as serpentine endemics (e.g., *Clarkia, Phacelia, Ceanothus, Gilia,* and *Mimulus*).

As we constructed our database, taxa with high variability in serpentine affinity scores were tagged for further research (e.g., through accession records; see Methodology) so that we might be able to discern taxa that truly varied geographically in their affinities from taxa that simply suffered from inadequate or faulty information. The former were called "regional indicators" by Kruckeberg (1984), i.e., taxa that are considered serpentine endemics or indicators in one part of their range but show less or no affinity for ultramafic substrates in other parts of their range. In his Appendix D, Kruckeberg (1984) tried to summarize where the different regional indicators he had identified occurred on ultramafics. We refer the reader to Kruckeberg (1984) for details on these taxa (most of which also occur in our database), but most regional indicators in our database can be recognized by searching for taxa with: (1) relatively wide geographic distributions, (2) lower mean serpentine affinity scores, and (3) high standard deviations in their affinity scores. Table 3 lists ten examples of regional indicator taxa in our database.

Some of the variability in our serpentine affinity scores is thus due to geographic variation in affinities, but some is also due to inadequate, statistically biased, or even faulty information from our sources. We attempted to offset these sources of variability by including as many sources as possible in our database (and by using accession records), but were not successful in all cases. We consider any taxon with a standard deviation in affinity score > 1.5, or having fewer than three sources, as being in "need of further research"; this includes about a third of the taxa in our database. Examples of such taxa include: *Lupinus lapidicola*—called a strict serpentine endemic by Kruckeberg (1984) and a strong serpentine indicator by CNPS (2004), and with 2/2 accession records in SMASCH with ultramafic habitat descriptions, but stated as occurring only on granites by the Jepson Manual (Hickman 1993) and Munz and Keck (1973); *Phacelia phacelioides*—Kruckeberg (1984) and V. Yadon (personal communication) believe this is a strict endemic, but the Jepson Manual is mute on the subject, and only 1/3 accession records in SMASCH are on ultramafics (but the two nonserpentine locations may have misidentified geology given the location); and *Allium lacunosum* var. *lacunosum*—both the Jepson Manual and Kruckeberg rate this as a strict endemic, Munz and Keck score it a strong indicator, but SMASCH has only 1/6 records on ultramafics.

Some species had surprising levels of ultramafic affinity. For example, our database includes a number of taxa that we personally have only rarely seen

on serpentine (e.g., *Lathyrus vestitus* var. *vestitus, Apiastrum angustifolium, Emmenanthe penduliflora* var. *penduliflora*). It also includes other taxa which we would have characterized as being clearly indifferent to ultramafic substrates, but which scored higher based on our sources (e.g., *Adenostoma fasciculatum, Pinus balfouriana* ssp. *balfouriana*). As noted above, some of these "discrepancies" may be due to inadequate or biased data—the ultramafic affinity of these types of taxa will drop as we collect more information. Many of these surprising affinities are probably real however, and they are simply a sign of our limited knowledge of the relationships between California plant life and ultramafic substrates.

In accession records, and in the literature, botanists and ecologists frequently misidentified basic rock types. For example, in accession records we found a number of examples of peridotite being called "volcanics" or even "sandstones". We also found multiple examples, in accession records as well as in the literature, of gabbro and other basic intrusive rocks being misidentified as ultramafics. Gabbro and "basic" rocks are "mafic" in composition—that is to say, they usually contain visible feldspars and they are geochemically distinct from ultramafic rocks. For example, the average alkali-gabbro contains 4–5 times as much Na as peridotite, 5–10 times as much P, 3–4 times as much K and Ca, and about ⅓ as much Mg (Ehlers and Blatt 1982). The famous gabbro outcrops of Eldorado County (Pine Hill) or San Diego County are therefore *not* ultramafic, even though the effect of the substrate on plant physiognomy and community composition may appear similar. A number of species in our database appear to be primarily, if not exclusively gabbro endemics, but we lacked sufficient information to remove them from our list. These include *Acanthomintha ilicifolia, Fremontodendron californicum* ssp. *decumbens,* and *Calochortus weedii* var. *vestus.*

As has been frequently noted (Mason 1946a, b; Raven and Axelrod 1978; Kruckeberg 1984, 2002; Skinner and Pavlik 1994; McCarten 1997), California's ultramafic soils support a very high proportion of the State's rare plants. Based on our database, almost 11% (111/1021) of California's rare plant taxa are either broadly or strictly restricted to ultramafic substrates; 15% of List 1b taxa (154/1021) show high affinity for ultramafic substrates (i.e., they are endemics or indicators). In northwestern California, 15% of plant taxa managed as "sensitive" by the Forest Service are serpentine endemics, and fully 30% are closely associated with ultramafics (J. K. Nelson and L. Hoover personal communication). In 2002, Kruckeberg wrote that "preservation of serpentine habitats in California is spotty, inadequate, and largely coincidental". Given the great importance of ultramafic substrates to the richness and distinctiveness of the California flora, the conservation of these unique habitats should be a high priority for land management agencies and private conservation organizations throughout the State.

Our database of serpentine affinity updates, and expands on the widely-used tables of serpentine endemic and "indicator" taxa published in 1984 by Art Kruckeberg in his classic monograph on California serpentine ecology. Our data are also a quantitative synthesis of the qualitative (and usually incomplete) allusions to serpentine affinity contained in habitat descriptions in California floras and flora databases, including Munz and Keck (1973), Hickman (1993), Oswald (2002), the online CalFlora Database (CalFlora 2004), and the California Native Plant Society Online Inventory of Rare and Endangered Plants (CNPS 2004). Our data on serpentine endemism should prove valuable to efforts in ecology, biosystematics (Baldwin 1995), conservation, and land management. In particular, we hope that our database will help us better understand the nature and degree of serpentine endemism in the California flora, and we hope it will spur the collection of additional, critical information necessary for conserving the rare plants and habitats of ultramafic substrates.

Acknowledgements

We would like to thank the following individuals for providing information on plant affinities to ultramafic substrates: Joe Callizo, Sydney Carothers, Susan Erwin, Linnea Hanson, Lisa Hoover, David Isle, Marla Knight, Niall McCarten, John McRae, Julie Kierstad Nelson, Tom Nelson, Robert Preston, Barbara Williams, and Vern Yadon. Dick Moe of the Jepson Herbarium provided us with data on identities and numbers of taxa endemic to California. Special thanks to Art Kruckeberg and Niall McCarten for comments on early versions of the manuscript.

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APPENDIX 1. PLANT TAXA WITH HIGH AFFINITY TO ULTRAMAFIC SUBSTRATES IN CALIFORNIA. Ordered by family and taxon. [1] Names as in Hickman (1993); names in parentheses are based on more recent revisions (see text for sources). [2] Affinity: SE = strict endemic, BE = broad endemic, BE/SI = broad endemic/strong indicator, SI = strong indicator, WI = weak indicator, WI/IN = weak indicator/indifferent. [3] Mean affinity score, including information from CalFlora. [4] Sum of all affinity scores, including CalFlora. [5] Median of affinity scores. [6] Standard deviation of affinity scores. [7] Standard error of affinity scores. [8] California Native Plant Society rarity codes, from CNPS Inventory of Rare and Endangered Plants of California, 11-2004. [9] Geographic distribution: KL = Klamath Ranges, NC = North Coast Ranges, BA = San Francisco Bay Area, SC = South Coast Ranges, SN = Sierra Nevada. [10] Taxonomic category. [11] carn = carnivorous, cesp = cespitose, hemipar = hemiparasitic, paras = parasitic, rhiz = rhizomatous. See text for more information.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9]					Tax. Cat.[10]	Lifeform[11]
										KL	NC	BA	SC	SN		
Angelica tomentosa	Apiaceae	SI	2.7	8	3	3.0	1.5	0.9		1	1		1		Dicot	Perennial forb
Apiastrum angustifolium	Apiaceae	WI	1.5	7.6	5	0.1	2.5	1.1		1	1	1	1		Dicot	Annual forb
Ligusticum californicum	Apiaceae	WI/IN	1.4	5.75	4	1.4	1.3	0.7		1	1			1	Dicot	Perennial forb
Lomatium ciliolatum	Apiaceae	SE	6.0	18	3	6.0	0.0	0.0			1	1	1		Dicot	Perennial forb
Lomatium congdonii	Apiaceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b					1	Dicot	Perennial forb
Lomatium dasycarpum ssp. *dasycarpum*	Apiaceae	BE/SI	3.6	21.5	6	3.5	1.9	0.8			1	1	1		Dicot	Perennial forb
Lomatium engelmannii	Apiaceae	SE	5.8	34.5	6	6.0	0.8	0.3	4	1	1				Dicot	Perennial forb
Lomatium hooveri	Apiaceae	SE	5.9	29.5	5	6.0	0.4	0.2	4		1				Dicot	Perennial forb
Lomatium howellii	Apiaceae	SE	6.1	24.5	4	6.0	0.0	0.0	4	1					Dicot	Perennial forb
Lomatium macrocarpum	Apiaceae	SI	2.7	8	3	3.0	0.6	0.3		1	1	1	1	1	Dicot	Perennial forb
Lomatium marginatum	Apiaceae	BE	5.0	25	5	6.0	1.4	0.6		1	1			1	Dicot	Perennial forb
Lomatium observatorium	Apiaceae	WI/IN	1.4	2.75	2	1.4	0.9	0.6				1	1		Dicot	Perennial forb
Lomatium parvifolium	Apiaceae	SI	3.3	13	4	3.0	2.3	1.1	4				1		Dicot	Perennial forb
Lomatium repostum	Apiaceae	SI	3.2	12.6	4	3.0	2.4	1.2	4		1				Dicot	Perennial forb
Lomatium tracyi	Apiaceae	SE	6.1	42.5	7	6.0	0.0	0.0	4	1	1				Dicot	Perennial forb
Lomatium triternatum var. *triternatum*	Apiaceae	SI	2.8	11	4	2.0	2.4	1.2		1	1				Dicot	Perennial forb
Lomatium utriculatum	Apiaceae	WI	1.7	8.5	5	1.0	1.4	0.6		1	1	1	1	1	Dicot	Perennial forb
Perideridia bacigalupii	Apiaceae	BE	4.6	23	5	6.0	2.4	1.1	4					1	Dicot	Perennial forb
Perideridia kelloggii	Apiaceae	WI	2.1	10.6	5	2.0	2.0	0.9			1	1	1	1	Dicot	Perennial forb
Perideridia leptocarpa	Apiaceae	SE	5.6	22.5	4	6.0	1.0	0.5	4	1					Dicot	Perennial forb
Perideridia oregana	Apiaceae	WI	1.7	5	3	1.0	1.2	0.7		1	1	1	1		Dicot	Perennial forb
Perideridia pringlei	Apiaceae	BE/SI	3.7	18.5	5	3.0	2.3	1.0	4				1		Dicot	Perennial forb
Sanicula bipinnatifida	Apiaceae	WI	1.8	7.1	4	2.0	1.5	0.7		1	1	1	1	1	Dicot	Perennial forb
Sanicula hoffmannii	Apiaceae	WI	1.8	3.5	2	1.5	2.1	1.5	4				1		Dicot	Perennial forb
Sanicula maritima	Apiaceae	WI	2.3	4.5	2	2.0	0.0	0.0	1b			1	1		Dicot	Perennial forb
Sanicula peckiana	Apiaceae	BE	5.3	26.5	5	6.0	1.3	0.6	4	1					Dicot	Perennial forb
Sanicula tracyi	Apiaceae	WI	2.1	8.5	4	1.0	2.6	1.3			1				Dicot	Perennial forb
Sanicula tuberosa	Apiaceae	WI/IN	1.3	3.75	3	1.0	0.7	0.4			1		1	1	Dicot	Perennial forb
Tauschia glauca	Apiaceae	BE/SI	3.5	10.5	3	3.0	0.6	0.3	4		1				Dicot	Perennial forb
Tauschia hartwegii	Apiaceae	WI/IN	1.3	4	3	1.0	1.5	0.9				1	1	1	Dicot	Perennial forb
Tauschia howellii	Apiaceae	WI	2.3	7	3	1.0	3.2	1.9		1					Dicot	Perennial forb
Tauschia kelloggii	Apiaceae	SI	2.6	12.75	5	2.0	2.2	1.0			1		1	1	Dicot	Perennial forb

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Asclepias solanoana	Asclepiadaceae	SE	6.0	42	7	6.0	0.0	0.0	4		1				Dicot	Perennial forb
Agoseris heterophylla	Asteraceae	WI/IN	1.4	4.1	3	1.0	1.5	0.9		1	1	1	1	1	Dicot	Annual forb
Ancistrocarphus filagineus	Asteraceae	SI	3.3	13	4	3.0	0.5	0.3		1	1	1	1	1	Dicot	Annual forb
Antennaria argentea	Asteraceae	WI	1.9	7.75	4	0.8	2.7	1.4		1	1				Dicot	Perennial forb
Antennaria suffrutescens	Asteraceae	SE	5.6	22.5	4	6.0	1.0	0.5	4	1	1				Dicot	Perennial forb
Arnica cernua	Asteraceae	SE	6.1	24.5	4	6.0	0.0	0.0	4	1					Dicot	Perennial forb (rhiz.)
Arnica spathulata	Asteraceae	SE	5.5	16.5	3	6.0	1.2	0.7	4	1					Dicot	Perennial forb (rhiz.)
Aster oregonensis	Asteraceae	WI/IN	1.1	3.25	3	1.0	0.9	0.5		1	1			1	Dicot	Perennial forb
Balsamorhiza macrolepis var. *macrolepis*	Asteraceae	SI	2.5	15	6	2.0	1.1	0.5	1b			1		1	Dicot	Perennial forb
Balsamorhiza sericea	Asteraceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b	1					Dicot	Perennial forb
Brickellia greenei	Asteraceae	BE/SI	3.7	11	3	4.0	0.6	0.3		1	1			1	Dicot	Perennial forb
Cacaliopsis nardosmia	Asteraceae	WI/IN	1.3	4	3	2.0	1.2	0.7		1	1				Dicot	Perennial forb
Calycadenia multiglandulosa	Asteraceae	SI	3.1	15.5	5	3.0	1.2	0.6			1	1	1	1	Dicot	Annual forb
Calycadenia oppositifolia	Asteraceae	SI	2.6	18	7	2.0	1.6	0.6	1b					1	Dicot	Annual forb
Calycadenia pauciflora	Asteraceae	BE	5.3	21	4	5.5	1.0	0.5			1				Dicot	Annual forb
Calycadenia truncata	Asteraceae	WI	2.1	12.5	6	2.5	1.1	0.5		1	1	1	1	1	Dicot	Annual forb
Chaenactis glabriuscula var. *glabriuscula*	Asteraceae	WI	1.7	5.1	3	2.0	1.5	0.9				1	1	1	Dicot	Perennial forb
Chaenactis glabriuscula var. *heterocarpha*	Asteraceae	SI	2.5	10	4	2.5	0.6	0.3			1	1	1	1	Dicot	Annual forb
Chaenactis suffrutescens	Asteraceae	SE	6.1	30.5	5	6.0	0.0	0.0	1b	1					Dicot	Perennial forb
Chrysothamnus nauseosus ssp. *consimilis*	Asteraceae	WI	1.8	8.85	5	2.0	1.5	0.7		1	1			1	Dicot	Shrub
Cirsium andrewsii	Asteraceae	WI	1.7	5	3	2.0	0.9	0.5	1b			1			Dicot	Perennial forb
Cirsium cymosum	Asteraceae	SI	3.0	12	4	2.0	2.0	1.0		1	1	1	1	1	Dicot	Perennial forb
Cirsium douglasii var. *breweri*	Asteraceae	SI	3.0	12	4	3.0	1.6	0.8		1	1			1	Dicot	Perennial forb
Cirsium fontinale var. *campylon*	Asteraceae	SE	5.9	29.5	5	6.0	0.4	0.2	1b			1	1		Dicot	Perennial forb
Cirsium fontinale var. *fontinale*	Asteraceae	SE	6.1	30.5	5	6.0	0.0	0.0	1b			1	1		Dicot	Perennial forb
Cirsium fontinale var. *obispoense*	Asteraceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b				1		Dicot	Perennial forb
Cirsium hydrophilum var. *vaseyi*	Asteraceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b		1	1			Dicot	Perennial forb
Cirsium remotifolium	Asteraceae	WI/IN	1.0	3.1	3	1.0	1.0	0.5		1	1	1			Dicot	Perennial forb
Coreopsis stillmanii	Asteraceae	SI	2.7	8	3	3.0	0.6	0.3			1		1	1	Dicot	Annual forb
Crepis pleurocarpa	Asteraceae	WI	2.0	10	5	2.0	0.7	0.3		1	1			1	Dicot	Perennial forb
Ericameria arborescens	Asteraceae	WI/IN	1.3	4	3	1.0	1.5	0.9		1	1		1	1	Dicot	Shrub
Ericameria greenei	Asteraceae	WI	2.0	8.1	4	1.5	2.1	1.1		1	1			1	Dicot	Shrub
Ericameria ophitidis	Asteraceae	SE	5.5	38.5	7	6.0	1.0	0.4	4	1	1				Dicot	Shrub

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9]					Tax. Cat.[10]	Lifeform[11]
										KL	NC	BA	SC	SN		
Erigeron angustatus	Asteraceae	SE	5.7	28.5	5	6.0	0.9	0.4	1b		1				Dicot	Perennial forb
Erigeron bloomeri var. *nudatus*	Asteraceae	SE	6.2	18.5	3	6.0	0.0	0.0	2	1					Dicot	Perennial forb
Erigeron cervinus	Asteraceae	SI	3.3	10	3	4.0	3.1	1.8		1					Dicot	Perennial forb (rhiz.)
Erigeron decumbens var. *robustior*	Asteraceae	WI	1.5	4.5	3	2.0	1.2	0.7	4		1				Dicot	Perennial forb
Erigeron foliosus var. *confinis*	Asteraceae	BE/SI	3.7	11	3	3.0	1.2	0.7		1					Dicot	Perennial forb
Erigeron lassenianus var. *deficiens*	Asteraceae	WI	1.7	5	3	2.0	1.5	0.9						1	Dicot	Perennial forb
Erigeron petrophilus var. *sierrensis*	Asteraceae	BE	4.8	28.5	6	6.0	2.1	0.8	4					1	Dicot	Perennial forb (rhiz.)
Erigeron petrophilus var. *viscidulus*	Asteraceae	WI	2.4	9.5	4	2.0	0.5	0.3	4	1					Dicot	Perennial forb (rhiz.)
Erigeron reductus	Asteraceae	WI	2.0	8	4	2.0	1.6	0.8		1	1			1	Dicot	Perennial forb
Erigeron serpentinus	Asteraceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b		1				Dicot	Perennial forb
Eriophyllum confertiflorum var. *tanacetiflorum*	Asteraceae	WI	1.9	3.75	2	1.9	1.6	1.1						1	Dicot	Shrub
Eriophyllum jepsonii	Asteraceae	BE/SI	3.5	17.5	5	3.0	1.5	0.7	4			1	1		Dicot	Shrub
Eriophyllum lanatum var. *achillaeoides*	Asteraceae	WI	2.3	7	3	2.0	0.6	0.3		1	1	1	1	1	Dicot	Shrub
Eriophyllum lanatum var. *lanceolatum*	Asteraceae	WI	1.7	5	3	2.0	1.5	0.9		1	1				Dicot	Shrub
Eriophyllum latilobum	Asteraceae	SE	5.5	16.5	3	6.0	1.2	0.7	1b			1	1		Dicot	Shrub
Grindelia hirsutula var. *davyi*	Asteraceae	WI	1.8	5.25	3	2.0	1.4	0.8			1			1	Dicot	Perennial forb
Grindelia hirsutula var. *hirsutula*	Asteraceae	WI/IN	1.2	3.6	3	1.0	1.0	0.5				1	1		Dicot	Perennial forb
Grindelia hirsutula var. *maritima*	Asteraceae	WI	1.7	5	3	2.0	0.9	0.5	1b			1			Dicot	Perennial forb
Gutierrezia californica	Asteraceae	WI	1.8	5.25	3	2.0	1.4	0.8			1	1	1		Dicot	Perennial forb, Shrub
Harmonia guggolziorum	Asteraceae	SE	6.0	18	3	6.0	0.0	0.0	1b		1				Dicot	Annual forb
Hazardia stenolepis	Asteraceae	WI	2.0	6.1	3	3.0	1.7	1.0					1		Dicot	Shrub (stem succulent)
Hazardia whitneyi var. *discoidea*	Asteraceae	WI	1.9	5.75	3	2.0	1.1	0.7		1					Dicot	Perennial forb, Shrub
Hazardia whitneyi var. *whitneyi*	Asteraceae	WI/IN	1.0	2	2	1.0	1.4	1.0						1	Dicot	Perennial forb, Shrub
Helenium bigelovii	Asteraceae	SI	2.9	11.5	4	2.5	2.3	1.2		1	1		1	1	Dicot	Perennial forb
Helianthus exilis	Asteraceae	SE	5.7	45.5	8	6.0	1.1	0.4	4	1	1		1	1	Dicot	Annual, Perennial forb

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Hemizonia congesta ssp. *calyculata*	Asteraceae	WI	1.5	4.5	3	2.0	1.2	0.7	4		1				Dicot	Annual forb
Hemizonia congesta ssp. *congesta*	Asteraceae	WI/IN	1.3	4	3	2.0	1.2	0.7			1	1	1		Dicot	Annual forb
Hemizonia congesta ssp. *tracyi*	Asteraceae	WI	1.8	5.25	3	2.0	0.7	0.4	4		1				Dicot	Annual forb
Hemizonia halliana	Asteraceae	SI	3.0	12	4	3.0	2.4	1.2					1		Dicot	Annual forb
Hesperevax sparsiflora var. *sparsiflora*	Asteraceae	WI	1.8	7.25	4	1.5	1.6	0.8			1	1	1		Dicot	Annual forb
Heterotheca oregona var. *oregona*	Asteraceae	WI	2.0	6	3	3.0	1.7	1.0		1	1		1		Dicot	Perennial forb
Hieracium bolanderi	Asteraceae	BE/SI	3.8	15	4	4.5	2.6	1.3		1	1				Dicot	Perennial forb
Hieracium greenei	Asteraceae	WI	2.2	6.5	3	3.0	1.4	0.8		1	1				Dicot	Perennial forb
Lagophylla glandulosa	Asteraceae	WI	2.0	6.1	3	3.0	1.7	1.0			1			1	Dicot	Annual forb
Lagophylla minor	Asteraceae	BE	4.7	23.5	5	5.0	1.7	0.7			1			1	Dicot	Annual forb
Layia discoidea	Asteraceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b				1		Dicot	Annual forb
Layia jonesii	Asteraceae	BE/SI	3.5	10.5	3	3.0	0.6	0.3	1b				1		Dicot	Annual forb
Layia septentrionalis	Asteraceae	SI	3.2	19	6	3.5	1.4	0.6	1b		1				Dicot	Annual forb
Lessingia arachnoidea	Asteraceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b			1			Dicot	Annual forb
Lessingia filaginifolia var. *californica*	Asteraceae	WI/IN	1.3	4	3	1.0	1.5	0.9		1	1	1	1	1	Dicot	Perennial forb, Shrub
Lessingia hololeuca	Asteraceae	SI	2.5	7.5	3	3.0	1.2	0.7	3		1	1			Dicot	Annual forb
Lessingia micradenia var. *glabrata*	Asteraceae	BE	5.1	30.5	6	5.5	1.3	0.5	1b			1			Dicot	Annual forb
Lessingia micradenia var. *micradenia*	Asteraceae	BE	5.3	31.5	6	5.5	1.0	0.4	1b			1			Dicot	Annual forb
Lessingia nemaclada	Asteraceae	WI	2.0	6	3	2.0	1.0	0.6		1	1	1	1	1	Dicot	Annual forb
Lessingia occidentalis	Asteraceae	BE/SI	4.1	16.5	4	4.0	1.8	0.9	4				1		Dicot	Annual forb
Lessingia ramulosa	Asteraceae	BE	5.4	27	5	6.0	1.3	0.6			1			1	Dicot	Annual forb
Luina hypoleuca	Asteraceae	WI/IN	1.4	4.25	3	2.0	1.0	0.6		1	1	1			Dicot	Perennial forb
Madia doris-nilesiae (= *Harmonia d.*)	Asteraceae	BE	5.4	32.5	6	5.5	0.8	0.3	1b	1					Dicot	Annual forb
Madia exigua	Asteraceae	WI	1.8	7.25	4	2.0	1.4	0.7		1	1	1	1	1	Dicot	Annual forb
Madia hallii (= *Harmonia h.*)	Asteraceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b		1				Dicot	Annual forb
Madia stebbinsii (= *Harmonia s.*)	Asteraceae	SE	6.1	42.5	7	6.0	0.0	0.0	1b		1				Dicot	Annual forb
Malacothrix clevelandii	Asteraceae	SI	3.0	9.1	3	3.0	3.0	1.7		1	1	1	1	1	Dicot	Annual forb
Malacothrix floccifera	Asteraceae	WI	2.1	6.25	3	3.0	1.6	0.9		1	1	1	1	1	Dicot	Annual forb
Micropus amphibolus	Asteraceae	WI	2.4	7.25	3	1.0	3.1	1.8			1	1	1		Dicot	Annual forb
Microseris douglasii	Asteraceae	WI/IN	1.3	4	3	1.0	0.6	0.3			1	1	1	1	Dicot	Annual forb
Monolopia gracilens	Asteraceae	WI	2.4	4.75	2	2.4	2.3	1.6				1	1		Dicot	Annual forb
Pentachaeta bellidiflora	Asteraceae	WI	2.4	7.25	3	3.0	1.3	0.8	1b			1			Dicot	Annual forb

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Pyrrocoma racemosa var. *congesta*	Asteraceae	SE	6.2	18.5	3	6.0	0.0	0.0	2	1					Dicot	Perennial forb
Pyrrocoma racemosa var. *pinetorum*	Asteraceae	BE/SI	4.0	16	4	4.5	2.4	1.2		1					Dicot	Perennial forb
Pyrrocoma racemosa var. *racemosa*	Asteraceae	WI	1.7	5	3	1.0	2.1	1.2			1	1	1		Dicot	Perennial forb
Raillardella pringlei	Asteraceae	SE	6.0	30	5	6.0	0.0	0.0	1b	1					Dicot	Perennial forb
Rigiopappus leptocladus	Asteraceae	WI	1.9	7.5	4	2.0	1.3	0.7		1	1	1	1	1	Dicot	Annual forb
Rudbeckia californica var. *glauca*	Asteraceae	BE	5.3	21	4	6.0	1.5	0.8		1	1				Dicot	Perennial forb
Senecio clevelandii var. *clevelandii* (= *Packera c. v. c.*)	Asteraceae	SE	5.8	46.5	8	6.0	0.7	0.3	4		1				Dicot	Perennial forb
Senecio clevelandii var. *heterophyllus* (= *Packera c. v. h.*)	Asteraceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b					1	Dicot	Perennial forb
Senecio eurycephalus var. *eurycephalus* (= *Packera eurycephala* var. *eurycephala*)	Asteraceae	BE/SI	3.8	15	4	3.0	1.5	0.8		1	1				Dicot	Perennial forb
Senecio eurycephalus var. *lewisrosei* (= *Packera eurycephala* var. *lewisrosei*)	Asteraceae	SE	5.8	40.5	7	6.0	0.8	0.3	1b					1	Dicot	Perennial forb
Senecio greenei (= *Packera g.*)	Asteraceae	BE	5.3	32	6	6.0	1.6	0.7		1	1				Dicot	Perennial forb
Senecio layneae (= *Packera l.*)	Asteraceae	BE	4.9	29.5	6	5.0	1.3	0.5	1b					1	Dicot	Perennial forb
Senecio macounii (= *Packera m.*)	Asteraceae	BE	5.1	20.5	4	6.0	2.0	1.0	4	1					Dicot	Perennial forb
Solidago guiradonis	Asteraceae	SE	6.2	18.5	3	6.0	0.0	0.0	4				1		Dicot	Perennial forb
Solidago multiradiata	Asteraceae	WI/IN	1.1	2.1	2	1.1	1.3	1.0		1				1	Dicot	Perennial forb
Stebbinsoseris decipiens	Asteraceae	WI	1.8	5.5	3	2.0	0.6	0.3	1b			1	1		Dicot	Annual forb
Wyethia bolanderi	Asteraceae	WI	1.5	3	2	1.5	0.7	0.5						1	Dicot	Perennial forb
Berberis aquifolium var. *aquifolium*	Berberidaceae	WI	1.6	4.75	3	1.0	1.2	0.7		1	1			1	Dicot	Shrub
Berberis aquifolium var. *repens*	Berberidaceae	WI	1.7	5	3	1.0	1.2	0.7		1	1			1	Dicot	Shrub
Vancouveria chrysantha	Berberidaceae	SE	6.2	18.5	3	6.0	0.0	0.0	4	1	1				Dicot	Perennial forb (rhiz.)
Vancouveria planipetala	Berberidaceae	WI	1.7	5	3	1.0	1.2	0.7		1	1	1	1		Dicot	Perennial forb (rhiz.)
Cryptantha clevelandii var. *dissita*	Boraginaceae	BE/SI	4.4	17.5	4	4.5	2.1	1.0	1b		1				Dicot	Annual forb
Cryptantha excavata	Boraginaceae	WI	1.5	3	2	1.5	2.1	1.5			1				Dicot	Annual forb

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Cryptantha flaccida	Boraginaceae	WI	1.6	4.75	3	2.0	0.7	0.4		1	1	1	1	1	Dicot	Annual forb
Cryptantha hispidula	Boraginaceae	SE	6.0	24	4	6.0	0.0	0.0		1	1				Dicot	Annual forb
Cryptantha intermedia	Boraginaceae	WI/IN	1.4	4.1	3	1.0	1.5	0.9		1	1	1	1	1	Dicot	Annual forb
Cryptantha mariposae	Boraginaceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b					1	Dicot	Annual forb
Cryptantha milobakeri	Boraginaceae	SI	3.3	9.75	3	3.0	2.6	1.5		1	1			1	Dicot	Annual forb
Cryptantha sobolifera	Boraginaceae	WI/IN	1.4	4.1	3	1.0	1.5	0.9		1				1	Dicot	Perennial forb
Hackelia bella	Boraginaceae	WI/IN	1.3	4	3	1.0	1.5	0.9		1	1				Dicot	Perennial forb
Pectocarya pusilla	Boraginaceae	WI/IN	1.3	2.5	2	1.3	1.1	0.8		1	1	1	1	1	Dicot	Annual forb
Arabis aculeolata	Brassicaceae	SE	6.1	24.5	4	6.0	0.0	0.0	2	1					Dicot	Perennial forb
Arabis constancei	Brassicaceae	SE	5.9	41.5	7	6.0	0.4	0.1	1b					1	Dicot	Perennial forb
Arabis koehleri var. *stipitata*	Brassicaceae	SE	5.5	16.5	3	6.0	1.2	0.7	1b	1					Dicot	Perennial forb
Arabis macdonaldiana	Brassicaceae	BE	5.4	32.5	6	6.0	1.0	0.4	1b	1	1				Dicot	Perennial forb
Arabis oregana	Brassicaceae	BE/SI	3.8	11.5	3	3.0	2.1	1.2	4	1	1				Dicot	Perennial forb
Arabis subpinnatifida	Brassicaceae	SI	3.2	16	5	3.0	1.6	0.7		1	1				Dicot	Perennial forb
Arabis suffrutescens var. *horizontalis*	Brassicaceae	BE/SI	3.9	27	7	3.0	1.6	0.6			1			1	Dicot	Perennial forb
Arabis suffrutescens var. *suffrutescens*	Brassicaceae	SI	2.9	17.5	6	2.5	1.9	0.8		1				1	Dicot	Perennial forb
Cardamine californica var. *cuneata*	Brassicaceae	WI	1.9	3.75	2	1.9	1.6	1.1					1		Dicot	Perennial forb (rhiz.)
Cardamine nuttallii var. *gemmata*	Brassicaceae	BE	5.2	15.5	3	5.0	1.0	0.6	1b	1					Dicot	Perennial forb (rhiz.)
Cardamine pachystigma var. *dissectifolia*	Brassicaceae	BE	5.4	48.5	9	6.0	1.0	0.3	3		1			1	Dicot	Perennial forb (rhiz.)
Cardamine pachystigma var. *pachystigma*	Brassicaceae	WI	2.0	6	3	2.0	1.0	0.6			1			1	Dicot	Perennial forb (rhiz.)
Caulanthus amplexicaulis var. *barbarae*	Brassicaceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b				1		Dicot	Annual forb
Draba aureola	Brassicaceae	SI	2.7	8	3	3.0	0.6	0.3	1b	1					Dicot	Perennial forb
Draba carnosula	Brassicaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b	1					Dicot	Perennial forb
Draba howellii	Brassicaceae	WI/IN	1.4	4.25	3	1.0	1.4	0.8		1					Dicot	Perennial forb
Erysimum franciscanum	Brassicaceae	SI	3.0	9	3	3.0	0.0	0.0	4		1	1	1		Dicot	Perennial forb
Guillenia flavescens	Brassicaceae	WI	2.3	9.25	4	2.5	1.6	0.8			1	1	1		Dicot	Annual forb
Streptanthus albidus ssp. *albidus*	Brassicaceae	BE	5.3	31.5	6	6.0	1.3	0.5	1b			1	1		Dicot	Annual forb
Streptanthus albidus ssp. *peramoenus*	Brassicaceae	BE/SI	4.3	34.5	8	4.5	1.9	0.7	1b			1	1		Dicot	Annual forb
Streptanthus barbatus	Brassicaceae	SE	5.6	28	5	6.0	0.5	0.2		1					Dicot	Perennial forb
Streptanthus barbiger	Brassicaceae	SE	6.0	24	4	6.0	0.0	0.0	4		1				Dicot	Annual forb
Streptanthus batrachopus	Brassicaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b		1	1			Dicot	Annual forb

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Streptanthus brachiatus var. *brachiatus*	Brassicaceae	SE	5.6	22.5	4	6.0	1.0	0.5	1b		1				Dicot	Annual, Perennial forb
Streptanthus brachiatus var. *hoffmanii*	Brassicaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b		1				Dicot	Annual, Perennial forb
Streptanthus breweri var. *breweri*	Brassicaceae	SE	5.7	40	7	6.0	0.8	0.3		1	1	1	1		Dicot	Annual forb
Streptanthus breweri var. *hesperidus*	Brassicaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b		1				Dicot	Annual forb
Streptanthus drepanoides	Brassicaceae	SE	6.1	36.5	6	6.0	0.0	0.0	4	1	1			1	Dicot	Annual forb
Streptanthus glandulosus ssp. *glandulosus*	Brassicaceae	WI	1.9	5.75	3	2.0	1.1	0.7			1	1	1		Dicot	Annual forb
Streptanthus glandulosus ssp. *pulchellus*	Brassicaceae	BE	4.9	24.5	5	6.0	1.8	0.8	1b		1	1			Dicot	Annual forb
Streptanthus glandulosus ssp. *secundus*	Brassicaceae	SI	3.3	20	6	3.0	1.5	0.6			1	1			Dicot	Annual forb
Streptanthus glandulosus ssp. *secundus* var. *hoffmanii*	Brassicaceae	SI	3.0	3	1	3.0	—	—	1b		1				Dicot	Annual forb
Streptanthus howellii	Brassicaceae	SE	6.1	30.5	5	6.0	0.0	0.0	1b	1					Dicot	Perennial forb
Streptanthus insignis ssp. *insignis*	Brassicaceae	BE/SI	4.0	20	5	4.0	2.4	1.1					1		Dicot	Annual forb
Streptanthus insignis ssp. *lyonii*	Brassicaceae	SI	3.3	16.5	5	2.0	2.7	1.2	1b				1		Dicot	Annual forb
Streptanthus morrisonii ssp. *elatus*	Brassicaceae	SE	6.1	30.5	5	6.0	0.0	0.0	1b		1				Dicot	Annual, Perennial forb
Streptanthus morrisonii ssp. *hirtiflorus*	Brassicaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b		1				Dicot	Annual, Perennial forb
Streptanthus morrisonii ssp. *kruckebergii*	Brassicaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b		1				Dicot	Annual, Perennial forb
Streptanthus morrisonii ssp. *morrisonii*	Brassicaceae	SE	6.1	30.5	5	6.0	0.0	0.0	1b		1				Dicot	Annual, Perennial forb
Streptanthus niger	Brassicaceae	SE	6.1	30.5	5	6.0	0.0	0.0	1b		1	1			Dicot	Annual forb
Streptanthus polygaloides	Brassicaceae	SE	5.7	28.5	5	6.0	0.9	0.4						1	Dicot	Annual forb
Streptanthus tortuosus var. *suffrutescens*	Brassicaceae	WI	1.6	8.2	5	2.0	1.6	0.7			1		1	1	Dicot	Annual, Perennial forb

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Streptanthus tortuosus var. *tortuosus*	Brassicaceae	WI/IN	1.4	4.25	3	2.0	1.0	0.6			1	1		1	Dicot	Annual, Perennial forb
Thelypodium brachycarpum	Brassicaceae	SI	3.3	10	3	3.0	0.6	0.3	4	1	1				Dicot	Annual, Perennial forb
Thlaspi californicum	Brassicaceae	SE	6.1	30.5	5	6.0	0.0	0.0	1b		1				Dicot	Perennial forb
Thlaspi montanum var. *montanum*	Brassicaceae	BE/SI	4.4	22	5	4.0	1.5	0.7		1	1				Dicot	Perennial forb
Campanula angustiflora	Campanulaceae	BE/SI	3.9	19.25	5	4.0	2.4	1.1			1	1			Dicot	Annual forb
Campanula exigua	Campanulaceae	BE/SI	3.9	19.5	5	4.0	1.5	0.7	1b			1	1		Dicot	Annual forb
Campanula griffinii	Campanulaceae	SE	6.0	18	3	6.0	0.0	0.0			1	1	1		Dicot	Annual forb
Campanula rotundifolia	Campanulaceae	BE	5.0	15	3	6.0	1.7	1.0		1					Dicot	Perennial forb
Campanula scabrella	Campanulaceae	SI	2.5	10	4	2.5	1.3	0.6	4	1					Dicot	Perennial forb (rhiz.)
Campanula sharsmithiae	Campanulaceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b			1	1		Dicot	Annual forb
Campanula wilkinsiana	Campanulaceae	WI/IN	1.0	5	5	0.0	1.7	0.8		1					Dicot	Perennial forb (rhiz.)
Githopsis diffusa ssp. *candida*	Campanulaceae	WI/IN	1.0	2	2	1.0	1.4	1.0					1		Dicot	Annual forb
Githopsis pulchella ssp. *campestris*	Campanulaceae	WI	1.6	3.25	2	1.6	1.9	1.4						1	Dicot	Annual forb
Githopsis pulchella ssp. *pulchella* var. *glabra*	Campanulaceae	BE/SI	3.8	19	5	3.0	2.0	0.9						1	Dicot	Annual forb
Githopsis pulchella ssp. *serpentinicola*	Campanulaceae	BE	5.3	21	4	5.5	1.0	0.5	4					1	Dicot	Annual forb
Nemacladus montanus	Campanulaceae	SE	6.0	18	3	6.0	0.0	0.0			1	1	1		Dicot	Annual forb
Arenaria kingii var. *glabrescens*	Caryophyllaceae	WI/IN	1.4	4.1	3	2.0	1.1	0.6						1	Dicot	Perennial forb
Cerastium arvense	Caryophyllaceae	WI	2.1	8.5	4	0.9	2.6	1.3		1	1	1	1	1	Dicot	Perennial forb
Minuartia californica	Caryophyllaceae	WI	1.7	5	3	2.0	1.5	0.9		1	1	1	1	1	Dicot	Annual forb
Minuartia cismontana (new taxon)	Caryophyllaceae	WI	1.8	3.5	2	1.8	1.8	1.3		1	1	1	1	1	Dicot	Annual, Perennial forb
Minuartia decumbens	Caryophyllaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b	1	1				Dicot	Perennial forb
Minuartia douglasii	Caryophyllaceae	SI	3.0	15	5	3.0	0.7	0.3		1	1	1	1	1	Dicot	Annual forb
Minuartia howellii	Caryophyllaceae	SE	5.7	28.5	5	6.0	0.9	0.4	1b	1					Dicot	Perennial forb
Minuartia nuttallii ssp. *gregaria*	Caryophyllaceae	SI	3.2	16	5	3.0	1.9	0.9		1	1				Dicot	Perennial forb
Minuartia rosei	Caryophyllaceae	SE	6.1	30.5	5	6.0	0.0	0.0	4	1	1				Dicot	Perennial forb
Minuartia stolonifera	Caryophyllaceae	SE	6.1	30.5	5	6.0	0.0	0.0	1b	1					Dicot	Perennial forb
Moehringia macrophylla	Caryophyllaceae	SI	2.7	8	3	3.0	0.6	0.3		1	1	1	1	1	Dicot	Perennial forb
Silene antirrhina	Caryophyllaceae	WI/IN	1.1	3.25	3	1.0	0.9	0.5		1	1	1	1	1	Dicot	Annual forb

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Silene campanulata ssp. *campanulata*	Caryophyllaceae	BE	5.3	31.5	6	5.5	1.0	0.4	4	1	1				Dicot	Perennial forb
Silene campanulata ssp. *glandulosa*	Caryophyllaceae	BE/SI	3.8	19	5	3.0	1.3	0.6		1	1				Dicot	Perennial forb
Silene grayi	Caryophyllaceae	WI	1.8	5.5	3	2.0	1.3	0.7		1					Dicot	Perennial forb
Silene hookeri ssp. *bolanderi*	Caryophyllaceae	BE	4.5	18	4	4.5	1.7	0.9		1	1				Dicot	Perennial forb
Silene hookeri ssp. *hookeri*	Caryophyllaceae	SI	3.0	12	4	2.5	2.2	1.1		1	1				Dicot	Perennial forb
Silene serpentinicola (new taxon)	Caryophyllaceae	SE	6.0	6	1	6.0	—	—		1					Dicot	Perennial forb (rhiz.)
Helianthemum suffrutescens (in *H. scoparium* in Jepson)	Cistaceae	WI/IN	1.0	2	2	1.0	1.4	1.0	3					1	Dicot	Shrub
Calystegia collina ssp. *collina*	Convolvulaceae	BE	4.7	33	7	6.0	1.6	0.6			1	1			Dicot	Perennial forb
Calystegia collina ssp. *oxyphylla*	Convolvulaceae	SE	5.6	33.5	6	6.0	1.2	0.5	4		1				Dicot	Perennial forb
Calystegia collina ssp. *tridactylosa*	Convolvulaceae	BE	4.5	18	4	4.5	1.7	0.9			1				Dicot	Perennial forb
Calystegia collina ssp. *venusta*	Convolvulaceae	BE	4.9	24.5	5	5.0	1.3	0.6	4				1		Dicot	Perennial forb
Calystegia malacophylla	Convolvulaceae	WI	1.5	4.5	3	1.0	1.3	0.8				1	1	1	Dicot	Perennial forb
Convolvulus simulans	Convolvulaceae	BE/SI	3.7	14.75	4	4.0	2.4	1.2	4			1	1		Dicot	Annual forb
Dudleya abramsii ssp. *bettinae*	Crassulaceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b				1		Dicot	Perennial forb
Dudleya abramsii ssp. *murina*	Crassulaceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b				1		Dicot	Perennial forb
Dudleya blochmaniae ssp. *blochmaniae*	Crassulaceae	SI	3.2	9.5	3	3.0	0.0	0.0	1b				1		Dicot	Perennial forb
Dudleya setchellii	Crassulaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b			1	1		Dicot	Perennial forb
Parvisedum pentandrum	Crassulaceae	WI	2.0	8.1	4	1.5	2.1	1.1			1	1	1		Dicot	Annual forb
Parvisedum pumilum	Crassulaceae	WI	1.7	5.1	3	2.0	1.5	0.9			1			1	Dicot	Annual forb
Sedum albomarginatum	Crassulaceae	SE	6.1	42.5	7	6.0	0.0	0.0	1b					1	Dicot	Perennial forb
Sedum eastwoodiae	Crassulaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b		1				Dicot	Perennial forb
Sedum laxum ssp. *flavidum*	Crassulaceae	SI	3.1	18.5	6	3.0	0.6	0.3	4	1	1				Dicot	Perennial forb
Sedum laxum ssp. *heckneri*	Crassulaceae	BE/SI	3.5	10.5	3	3.0	0.6	0.3	4	1	1				Dicot	Perennial forb
Sedum laxum ssp. *laxum*	Crassulaceae	BE/SI	4.0	16	4	3.5	1.4	0.7		1	1				Dicot	Perennial forb
Sedum obtusatum ssp. *obtusatum*	Crassulaceae	SI	3.2	16	5	3.0	2.2	1.0		1				1	Dicot	Perennial forb (rhiz.)
Sedum radiatum	Crassulaceae	WI	2.0	6	3	2.0	2.0	1.2		1	1	1	1	1	Dicot	Annual forb
Calocedrus decurrens	Cupressaceae	SI	3.0	9	3	3.0	0.0	0.0		1	1	1	1	1	Gymnosp.	Tree
Cupressus bakeri	Cupressaceae	SI	2.6	13	5	3.0	0.5	0.2	4	1				1	Gymnosp.	Tree
Cupressus lawsoniana	Cupressaceae	SI	3.0	15	5	3.0	0.7	0.3		1	1				Gymnosp.	Tree
Cupressus macnabiana	Cupressaceae	BE	4.7	28	6	4.5	1.2	0.5			1			1	Gymnosp.	Tree
Cupressus sargentii	Cupressaceae	BE	4.9	34	7	5.0	1.2	0.5			1	1	1		Gymnosp.	Tree
Juniperus communis var. *jackii*	Cupressaceae	BE/SI	4.0	8	2	4.0	2.8	2.0		1					Gymnosp.	Shrub

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Carex amplectens	Cyperaceae	SI	2.6	10.5	4	2.3	2.9	1.4						1	Monocot	Perennial gram. (cesp.)
Carex brainerdii	Cyperaceae	WI/IN	1.4	4.25	3	2.0	1.0	0.6		1	1		1	1	Monocot	Perennial gram. (rhiz.)
Carex gigas	Cyperaceae	BE	4.5	22.5	5	4.0	1.7	0.7	4	1				1	Monocot	Perennial gram. (rhiz.)
Carex mendocinensis	Cyperaceae	BE/SI	3.8	23	6	3.5	1.2	0.5		1	1			1	Monocot	Perennial gram. (cesp.)
Carex obispoensis	Cyperaceae	BE	4.9	24.5	5	6.0	1.6	0.7	1b				1		Monocot	Perennial gram. (cesp.)
Carex serpentinicola (new taxon)	Cyperaceae	SE	5.5	11	2	5.5	0.7	0.5	2	1					Monocot	Perennial gram. (rhiz.)
Carex serratodens	Cyperaceae	BE	4.9	39	8	5.0	1.1	0.4			1	1	1	1	Monocot	Perennial gram. (cesp.)
Carex spissa	Cyperaceae	SI	2.8	8.25	3	2.0	2.9	1.7					1		Monocot	Perennial gram. (rhiz.)
Polystichum lemmonii	Dryopteridaceae	SE	6.0	24	4	6.0	0.0	0.0		1	1			1	Pteridoph.	Perennial forb (rhiz.)
Polystichum scopulinum	Dryopteridaceae	WI	1.7	5.1	3	2.0	1.5	0.9		1	1			1	Pteridoph.	Perennial forb (rhiz.)
Arctostaphylos bakeri ssp. *bakeri*	Ericaceae	SE	5.5	27.5	5	6.0	1.3	0.6	1b		1				Dicot	Shrub
Arctostaphylos bakeri ssp. *sublaevis*	Ericaceae	SE	6.3	12.5	2	6.0	0.0	0.0	1b		1				Dicot	Shrub
Arctostaphylos canescens ssp. *sonomensis*	Ericaceae	SI	2.5	12.5	5	3.0	1.5	0.7	1b	1	1				Dicot	Shrub
Arctostaphylos hispidula	Ericaceae	BE	4.5	22.5	5	4.0	1.1	0.5	4	1	1				Dicot	Shrub
Arctostaphylos hookeri ssp. *franciscana*	Ericaceae	SE	6.2	18.5	3	6.0	0.0	0.0	1a			1	1		Dicot	Shrub
Arctostaphylos hookeri ssp. *montana*	Ericaceae	BE	4.9	19.5	4	4.5	1.0	0.5	1b			1	1		Dicot	Shrub
Arctostaphylos hookeri ssp. *ravenii*	Ericaceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b			1	1		Dicot	Shrub

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Arctostaphylos klamathensis	Ericaceae	BE/SI	3.9	19.5	5	4.0	1.8	0.8	1b	1					Dicot	Shrub
Arctostaphylos nortensis	Ericaceae	SI	2.8	5.5	2	2.5	0.7	0.5	4	1					Dicot	Shrub
Arctostaphylos obispoensis	Ericaceae	SE	5.7	28.5	5	6.0	0.9	0.4	4				1		Dicot	Shrub
Arctostaphylos stanfordiana ssp. *raichei*	Ericaceae	SI	2.6	10.5	4	3.0	1.7	0.9	1b		1				Dicot	Shrub
Arctostaphylos viscida ssp. *pulchella*	Ericaceae	BE	5.0	25	5	5.0	1.0	0.4		1	1				Dicot	Shrub
Arctostaphylos viscida ssp. *viscida*	Ericaceae	WI	2.2	10.75	5	3.0	1.2	0.5		1				1	Dicot	Shrub
Pyrola picta ssp. *dentata*	Ericaceae	WI	2.0	6	3	3.0	1.7	1.0		1	1				Dicot	Perennial forb (rhiz.)
Vaccinium coccineum	Ericaceae	BE/SI	3.5	3.5	1	3.0	—	—	3	1					Dicot	Shrub
Astragalus breweri	Fabaceae	SI	3.2	15.75	5	3.0	2.0	0.9	4		1	1			Dicot	Annual forb
Astragalus clarianus (*claranus*)	Fabaceae	SI	3.0	6	2	3.0	0.0	0.0	1b		1				Dicot	Annual forb
Astragalus clevelandii	Fabaceae	SE	6.1	24.5	4	6.0	0.0	0.0	4		1		1		Dicot	Perennial forb
Astragalus curtipes	Fabaceae	WI	1.8	3.5	2	1.8	1.8	1.3					1		Dicot	Perennial forb
Astragalus macrodon	Fabaceae	WI/IN	1.3	3.75	3	1.0	0.7	0.4	4				1		Dicot	Perennial forb
Astragalus rattanii var. *jepsonianus*	Fabaceae	BE/SI	4.3	25.5	6	4.0	1.2	0.5	1b		1				Dicot	Annual forb
Astragalus whitneyi var. *siskiyouensis*	Fabaceae	BE	4.6	23	5	5.0	1.1	0.5		1	1				Dicot	Perennial forb
Hoita strobilina	Fabaceae	SI	2.5	5	2	2.5	2.1	1.5	1b			1			Dicot	Perennial forb
Lathyrus biflorus	Fabaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b		1				Dicot	Perennial forb
Lathyrus delnorticus	Fabaceae	BE	5.3	10.5	2	5.0	1.4	1.0	4	1					Dicot	Perennial forb
Lathyrus vestitus var. *vestitus*	Fabaceae	WI	1.8	7.2	4	0.6	2.8	1.4			1	1	1		Dicot	Perennial forb
Lotus junceus var. *junceus*	Fabaceae	WI	1.5	3	2	1.5	0.7	0.5					1		Dicot	Perennial forb
Lupinus constancei	Fabaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b		1				Dicot	Perennial forb
Lupinus lapidicola	Fabaceae	SI	3.0	15	5	3.0	3.0	1.3	4	1	1				Dicot	Perennial forb
Lupinus onustus	Fabaceae	SI	3.1	15.25	5	3.0	2.9	1.3		1				1	Dicot	Perennial forb
Lupinus spectabilis	Fabaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b					1	Dicot	Annual forb
Pediomelum californicum	Fabaceae	BE/SI	4.4	21.75	5	6.0	2.4	1.1			1	1	1		Dicot	Perennial forb
Trifolium amoenum	Fabaceae	WI/IN	1.3	2.5	2	1.0	1.4	1.0	1b		1	1			Dicot	Annual forb
Trifolium fucatum	Fabaceae	WI/IN	1.3	4	3	1.0	0.6	0.3			1		1		Dicot	Annual forb
Trifolium gracilentum var. *gracilentum*	Fabaceae	WI/IN	1.0	3.1	3	1.0	1.0	0.5		1	1	1	1	1	Dicot	Annual forb
Trifolium longipes var. *elmeri*	Fabaceae	BE	5.3	21	4	6.0	1.5	0.8		1	1				Dicot	Perennial forb
Trifolium longipes var. *oreganum*	Fabaceae	BE/SI	4.0	12	3	4.0	2.0	1.2		1	1				Dicot	Perennial forb
Trifolium microcephalum	Fabaceae	WI/IN	1.4	7	5	1.0	1.1	0.5		1	1			1	Dicot	Annual forb
Trifolium willdenovii	Fabaceae	WI/IN	1.3	4	3	1.0	0.6	0.3		1	1	1	1	1	Dicot	Annual forb

Appendix 1. Continued.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Lithocarpus densiflorus var. *echinoides*	Fagaceae	SI	2.5	12.25	5	1.0	2.5	1.1		1				1	Dicot	Shrub
Quercus durata var. *durata*	Fagaceae	SE	5.8	40.5	7	6.0	0.8	0.3			1	1	1	1	Dicot	Shrub
Quercus vaccinifolia	Fagaceae	SI	2.5	12.25	5	2.0	2.2	1.0		1	1			1	Dicot	Shrub
Garrya buxifolia	Garryaceae	SE	5.8	29	5	6.0	0.4	0.2		1	1				Dicot	Shrub
Garrya congdonii	Garryaceae	BE	5.0	30	6	5.5	1.3	0.5		1	1	1		1	Dicot	Shrub
Centaurium tricanthum	Gentianaceae	SE	5.5	11	2	5.5	0.7	0.5			1	1			Dicot	Annual forb
Gentiana setigera	Gentianaceae	SE	5.8	17.5	3	6.0	0.3	0.2		1	1				Dicot	Perennial forb
Swertia fastigiata	Gentianaceae	WI	1.5	3	2	1.5	2.1	1.5		1					Dicot	Perennial forb
Emmenanthe penduliflora var. *penduliflora*	Hydrophyllaceae	WI	1.8	7	4	2.0	0.5	0.3			1	1	1	1	Dicot	Annual forb
Emmenanthe penduliflora var. *rosea*	Hydrophyllaceae	BE/SI	4.3	17	4	4.5	1.7	0.9				1	1		Dicot	Annual forb
Phacelia breweri	Hydrophyllaceae	SE	5.5	11	2	5.5	0.7	0.5				1	1		Dicot	Annual forb
Phacelia californica	Hydrophyllaceae	WI/IN	1.4	4.25	3	1.0	1.4	0.8			1	1	1		Dicot	Perennial forb
Phacelia corymbosa	Hydrophyllaceae	SE	5.5	33	6	6.0	0.8	0.3		1	1				Dicot	Perennial forb
Phacelia dalesiana	Hydrophyllaceae	SE	6.1	30.5	5	6.0	0.0	0.0	4	1					Dicot	Perennial forb
Phacelia distans	Hydrophyllaceae	WI/IN	1.1	2.1	2	1.1	1.3	1.0			1	1	1		Dicot	Annual forb
Phacelia divaricata	Hydrophyllaceae	WI	2.3	7	3	3.0	1.2	0.7			1	1	1		Dicot	Annual forb
Phacelia egena	Hydrophyllaceae	WI	2.1	6.25	3	3.0	1.6	0.9		1	1	1	1	1	Dicot	Perennial forb
Phacelia greenei	Hydrophyllaceae	SE	6.1	36.5	6	6.0	0.0	0.0	1b	1					Dicot	Annual forb
Phacelia imbricata ssp. *imbricata*	Hydrophyllaceae	WI	1.7	5	3	1.0	1.2	0.7			1	1	1	1	Dicot	Perennial forb
Phacelia leonis	Hydrophyllaceae	BE/SI	3.9	27.5	7	4.0	1.1	0.4	1b	1					Dicot	Annual forb
Phacelia phacelioides	Hydrophyllaceae	BE/SI	4.2	12.5	3	6.0	3.2	1.8				1	1		Dicot	Annual forb
Phacelia pringlei	Hydrophyllaceae	BE/SI	4.0	12	3	4.0	1.0	0.6		1					Dicot	Annual forb
Phacelia purpusii	Hydrophyllaceae	WI/IN	1.1	2.1	2	1.1	1.3	1.0						1	Dicot	Annual forb
Iris bracteata	Iridaceae	SE	5.8	11.5	2	5.5	0.7	0.5	3	1					Monocot	Perennial forb (rhiz.)
Iris innominata	Iridaceae	SE	5.8	11.5	2	5.5	0.7	0.5	4	1	1				Monocot	Perennial forb (rhiz.)
Iris macrosiphon	Iridaceae	WI/IN	1.1	3.25	3	1.0	0.9	0.5			1	1		1	Monocot	Perennial forb (rhiz.)
Iris tenuissima ssp. *purdyiformis*	Iridaceae	WI	1.5	3	2	1.5	2.1	1.5		1				1	Monocot	Perennial forb (rhiz.)
Acanthomintha duttonii	Lamiaceae	SE	6.1	30.5	5	6.0	0.0	0.0	1b			1	1		Dicot	Annual forb
Acanthomintha ilicifolia	Lamiaceae	WI/IN	1.3	3	3	0.0	1.7	1.0					1		Dicot	Annual forb
Acanthomintha lanceolata	Lamiaceae	SI	3.4	16.75	5	3.0	2.1	0.9	4			1	1		Dicot	Annual forb
Acanthomintha obovata ssp. *obovata*	Lamiaceae	BE/SI	3.5	10.5	3	3.0	2.5	1.5	4				1		Dicot	Annual forb

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Monardella antonina ssp. *benitensis*	Lamiaceae	SE	6.1	24.5	4	6.0	0.0	0.0	4				1		Dicot	Perennial forb (rhiz.)
Monardella douglasii ssp. *douglasii*	Lamiaceae	SI	3.0	6	2	3.0	1.4	1.0			1	1	1		Dicot	Annual forb
Monardella follettii	Lamiaceae	SE	5.8	34.5	6	6.0	0.8	0.3	1b					1	Dicot	Shrub
Monardella palmeri	Lamiaceae	BE	4.8	28.5	6	6.0	2.2	0.9	1b				1		Dicot	Perennial forb (rhiz.)
Monardella purpurea	Lamiaceae	BE/SI	4.4	22	5	6.0	2.3	1.0		1	1	1	1		Dicot	Perennial forb
Monardella sheltonii	Lamiaceae	SI	3.0	18	6	3.0	1.7	0.7		1	1			1	Dicot	Perennial forb
Monardella stebbinsii	Lamiaceae	SE	6.1	30.5	5	6.0	0.0	0.0	1b					1	Dicot	Perennial forb (rhiz.)
Monardella viridis ssp. *viridis*	Lamiaceae	BE/SI	4.3	17	4	4.5	2.1	1.0			1				Dicot	Perennial forb
Salvia sonomensis	Lamiaceae	WI	1.6	9.5	6	1.5	1.3	0.5		1	1	1	1	1	Dicot	Shrub
Scutellaria antirrhinoides	Lamiaceae	WI	2.3	11.5	5	3.0	1.5	0.7		1	1			1	Dicot	Perennial forb
Stachys pycnantha	Lamiaceae	WI	2.2	11	5	1.0	2.4	1.1		1	1	1	1	1	Dicot	Perennial forb
Trichostema laxum	Lamiaceae	BE/SI	4.0	16	4	4.5	2.4	1.2		1	1				Dicot	Annual forb
Trichostema rubisepalum	Lamiaceae	BE	5.4	21.5	4	6.0	1.5	0.8	4		1		1	1	Dicot	Annual forb
Pinguicula vulgaris ssp. *macroceras*	Lentibulariaceae	SE	6.2	18.5	3	6.0	0.0	0.0	2	1					Dicot	Perennial forb (carn.)
Allium acuminatum	Liliaceae	WI	1.5	4.5	3	2.0	0.9	0.5		1	1	1			Monocot	Perennial forb (bulb)
Allium amplectens	Liliaceae	WI	2.3	11.25	5	2.0	2.2	1.0		1	1	1	1	1	Monocot	Perennial forb (bulb)
Allium bolanderi var. *bolanderi*	Liliaceae	WI/IN	1.1	4.5	4	1.0	0.6	0.3		1	1	1			Monocot	Perennial forb (bulb)
Allium bolanderi var. *mirabile*	Liliaceae	WI	2.0	4	2	2.0	0.0	0.0		1	1				Monocot	Perennial forb (bulb)
Allium cratericola	Liliaceae	SI	2.6	15.75	6	2.5	1.9	0.8		1	1			1	Monocot	Perennial forb (bulb)
Allium crispum	Liliaceae	WI/IN	1.3	3.75	3	1.0	0.7	0.4				1	1		Monocot	Perennial forb (bulb)
Allium diabloense	Liliaceae	SE	6.0	18	3	6.0	0.0	0.0					1		Monocot	Perennial forb (bulb)
Allium falcifolium	Liliaceae	BE/SI	4.2	38	9	4.0	1.6	0.5		1	1	1			Monocot	Perennial forb (bulb)
Allium fimbriatum var. *purdyi*	Liliaceae	BE	5.4	21.5	4	6.0	1.5	0.8	4		1				Monocot	Perennial forb (bulb)
Allium hoffmanii	Liliaceae	SE	6.1	30.5	5	6.0	0.0	0.0	4	1	1				Monocot	Perennial forb (bulb)
Allium howellii var. *sanbenitense*	Liliaceae	BE/SI	4.0	12	3	4.0	1.0	0.6					1		Monocot	Perennial forb (bulb)

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Allium jepsonii	Liliaceae	BE	5.4	37.5	7	6.0	1.0	0.4	1b					1	Monocot	Perennial forb (bulb)
Allium lacunosum var. *lacunosum*	Liliaceae	BE/SI	3.8	15.25	4	4.5	2.8	1.4				1	1		Monocot	Perennial forb (bulb)
Allium lacunosum var. *micranthum*	Liliaceae	BE/SI	4.3	13	3	6.0	2.9	1.7					1		Monocot	Perennial forb (bulb)
Allium membranaceum	Liliaceae	WI/IN	1.3	4	3	1.0	1.5	0.9		1				1	Monocot	Perennial forb (bulb)
Allium obtusum var. *conspicuum*	Liliaceae	WI/IN	1.0	2	2	1.0	1.4	1.0						1	Monocot	Perennial forb (bulb)
Allium peninsulare var. *franciscanum*	Liliaceae	WI	1.8	3.5	2	1.8	1.8	1.3	1b			1	1		Monocot	Perennial forb (bulb)
Allium sanbornii var. *congdonii*	Liliaceae	SE	5.6	22.5	4	6.0	1.0	0.5	4					1	Monocot	Perennial forb (bulb)
Allium sanbornii var. *sanbornii*	Liliaceae	SI	3.4	27	8	3.5	2.2	0.8	4					1	Monocot	Perennial forb (bulb)
Allium serra	Liliaceae	SI	2.6	10.5	4	3.0	1.5	0.7			1	1	1		Monocot	Perennial forb (bulb)
Allium sharsmithiae	Liliaceae	BE	5.1	20.5	4	6.0	2.0	1.0	1b			1	1		Monocot	Perennial forb (bulb)
Allium siskiyouense	Liliaceae	SI	2.8	14	5	2.0	1.8	0.8	4	1	1				Monocot	Perennial forb (bulb)
Allium tuolumnense	Liliaceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b					1	Monocot	Perennial forb (bulb)
Allium unifolium	Liliaceae	WI/IN	1.0	3	3	1.0	1.0	0.6			1	1	1		Monocot	Perennial forb (bulb)
Brodiaea californica var. *californica*	Liliaceae	WI/IN	1.1	4.5	4	1.3	1.0	0.5			1			1	Monocot	Perennial forb
Brodiaea californica var. *leptandra*	Liliaceae	WI	2.0	4	2	2.0	1.4	1.0			1				Monocot	Perennial forb
Brodiaea coronaria ssp. *coronaria*	Liliaceae	WI/IN	1.0	2	2	1.0	1.4	1.0		1	1			1	Monocot	Perennial forb
Brodiaea coronaria ssp. *rosea*	Liliaceae	SE	5.5	27.5	5	6.0	1.3	0.6	1b		1				Monocot	Perennial forb
Brodiaea pallida	Liliaceae	BE	4.9	19.5	4	5.0	1.5	0.8	1b					1	Monocot	Perennial forb
Brodiaea purdyi	Liliaceae	WI	2.2	11	5	2.0	0.8	0.4						1	Monocot	Perennial forb
Brodiaea stellaris	Liliaceae	SE	6.0	18	3	6.0	0.0	0.0			1				Monocot	Perennial forb
Calochortus clavatus var. *clavatus*	Liliaceae	BE	4.5	13.5	3	4.0	0.6	0.3	4				1		Monocot	Perennial forb (bulb)
Calochortus coeruleus var. *fimbriatus*	Liliaceae	WI	1.5	4.5	3	1.0	1.3	0.8		1	1			1	Monocot	Perennial forb (bulb)
Calochortus elegans var. *nanus*	Liliaceae	WI	2.0	4	2	2.0	1.4	1.0		1					Monocot	Perennial forb (bulb)

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Calochortus greenei	Liliaceae	SE	6.0	12	2	6.0	0.0	0.0		1					Monocot	Perennial forb (bulb)
Calochortus nudus	Liliaceae	WI	2.1	8.5	4	2.5	1.2	0.6		1				1	Monocot	Perennial forb (bulb)
Calochortus obispoensis	Liliaceae	BE	5.4	21.5	4	6.0	1.5	0.8	1b				1		Monocot	Perennial forb (bulb)
Calochortus raichei	Liliaceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b		1				Monocot	Perennial forb (bulb)
Calochortus tiburonensis	Liliaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b		1	1			Monocot	Perennial forb (bulb)
Calochortus umbellatus	Liliaceae	SI	2.9	14.5	5	3.0	1.1	0.5	4		1	1			Monocot	Perennial forb (bulb)
Calochortus uniflorus	Liliaceae	WI	1.7	5	3	1.0	1.2	0.7		1	1	1	1		Monocot	Perennial forb (bulb)
Calochortus vestae	Liliaceae	WI	2.0	6	3	2.0	1.0	0.6		1	1				Monocot	Perennial forb (bulb)
Calochortus weedii var. *vestus*	Liliaceae	WI/IN	1.0	3	3	0.0	1.7	1.0	1b				1		Monocot	Perennial forb (bulb)
Chlorogalum angustifolium	Liliaceae	WI	2.4	9.5	4	1.8	2.8	1.4			1			1	Monocot	Perennial forb (bulb)
Chlorogalum grandiflorum	Liliaceae	BE	5.2	26	5	6.0	1.1	0.5	1b					1	Monocot	Perennial forb (bulb)
Chlorogalum pomeridianum var. *minus*	Liliaceae	SE	6.1	30.5	5	6.0	0.0	0.0	1b		1	1	1		Monocot	Perennial forb (bulb)
Chlorogalum purpureum var. *reductum*	Liliaceae	SE	5.5	16.5	3	6.0	1.2	0.7	1b				1		Monocot	Perennial forb (bulb)
Erythronium californicum	Liliaceae	SI	2.7	8	3	2.0	2.1	1.2		1	1				Monocot	Perennial forb (bulb)
Erythronium citrinum var. *citrinum*	Liliaceae	BE/SI	4.3	21.5	5	4.0	0.4	0.2	4	1					Monocot	Perennial forb (bulb)
Erythronium citrinum var. *roderickii*	Liliaceae	BE	4.7	37.5	8	4.5	1.4	0.5	1b	1					Monocot	Perennial forb (bulb)
Erythronium helenae	Liliaceae	BE	4.5	18	4	4.5	1.7	0.9	4		1				Monocot	Perennial forb (bulb)
Erythronium hendersonii	Liliaceae	SI	2.5	5	2	2.5	3.5	2.5		1					Monocot	Perennial forb (bulb)
Erythronium howellii	Liliaceae	WI	2.3	7	3	2.0	2.5	1.5	1b	1					Monocot	Perennial forb (bulb)
Erythronium multiscapoideum	Liliaceae	SI	3.0	15	5	2.0	1.7	0.8						1	Monocot	Perennial forb (bulb)
Erythronium purpurascens	Liliaceae	WI/IN	1.0	2	2	1.0	1.4	1.0						1	Monocot	Perennial forb (bulb)

Appendix 1. Continued.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Erythronium tuolumnense	Liliaceae	SI	2.5	5	2	2.5	3.5	2.5						1	Monocot	Perennial forb (bulb)
Fritillaria affinis var. *affinis*	Liliaceae	WI	2.0	6	3	2.0	0.0	0.0		1	1	1		1	Monocot	Perennial forb (bulb)
Fritillaria agrestis	Liliaceae	SI	2.7	13.25	5	2.0	1.6	0.7	4		1	1	1	1	Monocot	Perennial forb (bulb)
Fritillaria biflora var. *biflora*	Liliaceae	WI	2.3	9	4	2.5	1.7	0.9			1	1	1		Monocot	Perennial forb
Fritillaria biflora var. *ineziana*	Liliaceae	BE	5.4	21.5	4	6.0	1.5	0.8	1b			1			Monocot	Perennial forb (bulb)
Fritillaria eastwoodiae	Liliaceae	WI	2.3	13.5	6	2.0	0.4	0.2	3					1	Monocot	Perennial forb (bulb)
Fritillaria falcata	Liliaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b			1	1		Monocot	Perennial forb (bulb)
Fritillaria glauca	Liliaceae	BE/SI	4.3	17.25	4	5.5	2.7	1.4		1	1				Monocot	Perennial forb
Fritillaria liliacea	Liliaceae	WI	1.8	7	4	1.5	1.1	0.6	1b			1	1		Monocot	Perennial forb (bulb)
Fritillaria pluriflora	Liliaceae	WI	2.4	9.5	4	2.5	1.5	0.7			1			1	Monocot	Perennial forb (bulb)
Fritillaria purdyi	Liliaceae	BE	4.5	31.5	7	4.0	1.8	0.7	4	1	1				Monocot	Perennial forb (bulb)
Fritillaria recurva var. *coccinea*	Liliaceae	SI	2.7	8	3	2.0	3.1	1.8			1				Monocot	Perennial forb (bulb)
Fritillaria recurva var. *recurva*	Liliaceae	SI	2.7	8	3	3.0	0.6	0.3		1	1			1	Monocot	Perennial forb (bulb)
Fritillaria viridea	Liliaceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b				1		Monocot	Perennial forb (bulb)
Hastingsia alba	Liliaceae	SI	3.4	17	5	3.0	1.5	0.7		1	1			1	Monocot	Perennial forb (bulb)
Hastingsia serpentinicola	Liliaceae	SE	6.0	18	3	6.0	0.0	0.0		1	1				Monocot	Perennial forb (bulb)
Lilium bolanderi	Liliaceae	SE	6.2	18.5	3	6.0	0.0	0.0	4	1					Monocot	Perennial forb (bulb)
Lilium kelloggii	Liliaceae	SI	2.5	10	4	2.0	1.9	1.0		1	1				Monocot	Perennial forb (bulb)
Lilium rubescens	Liliaceae	WI	2.0	9.75	5	2.0	1.4	0.6	4	1	1	1			Monocot	Perennial forb (bulb)
Lilium washingtonianum ssp. *purpurascens*	Liliaceae	BE/SI	3.5	10.5	3	3.0	2.5	1.5	4	1					Monocot	Perennial forb (bulb)
Muilla maritima	Liliaceae	WI	2.0	6	3	2.0	1.0	0.6			1	1	1	1	Monocot	Perennial forb
Odontostomum hartwegii	Liliaceae	SI	2.7	8	3	3.0	0.6	0.3			1			1	Monocot	Perennial forb
Triteleia bridgesii	Liliaceae	SI	3.3	13	4	3.5	1.7	0.9		1	1			1	Monocot	Perennial forb

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Triteleia crocea var. *crocea*	Liliaceae	SI	3.3	10	3	3.0	2.5	1.5	4	1					Monocot	Perennial forb
Triteleia crocea var. *modesta*	Liliaceae	BE	4.5	22.5	5	4.0	1.5	0.7	4	1					Monocot	Perennial forb
Triteleia ixioides ssp. *cookii*	Liliaceae	BE	4.5	13.5	3	6.0	2.9	1.7	1b				1		Monocot	Perennial forb
Triteleia peduncularis	Liliaceae	BE/SI	3.8	19	5	3.0	2.2	1.0		1	1	1	1		Monocot	Perennial forb
Xerophyllum tenax	Liliaceae	WI	1.6	8	5	1.0	0.9	0.4		1	1	1	1	1	Monocot	Perennial forb (rhiz.)
Zigadenus micranthus var. *fontanus*	Liliaceae	BE/SI	3.8	23	6	4.0	0.8	0.3	4		1	1	1		Monocot	Perennial forb (bulb)
Zigadenus paniculatus	Liliaceae	WI	1.6	4.75	3	2.0	0.7	0.4		1	1			1	Monocot	Perennial forb (bulb)
Hesperolinon adenophyllum	Linaceae	SE	5.7	28.5	5	6.0	0.9	0.4	1b		1				Dicot	Annual forb
Hesperolinon bicarpellatum	Linaceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b		1				Dicot	Annual forb
Hesperolinon breweri	Linaceae	SI	2.5	10	4	2.5	1.5	0.7	1b		1	1			Dicot	Annual forb
Hesperolinon californicum	Linaceae	SI	2.8	8.5	3	3.0	0.6	0.3			1	1	1	1	Dicot	Annual forb
Hesperolinon clevelandii	Linaceae	WI	2.0	8	4	2.0	1.8	0.9			1	1			Dicot	Annual forb
Hesperolinon congestum	Linaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b		1	1			Dicot	Annual forb
Hesperolinon didymocarpum	Linaceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b		1				Dicot	Annual forb
Hesperolinon disjunctum	Linaceae	SE	6.0	18	3	6.0	0.0	0.0			1	1	1		Dicot	Annual forb
Hesperolinon drymarioides	Linaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b		1				Dicot	Annual forb
Hesperolinon micranthum	Linaceae	WI	2.4	11.75	5	3.0	1.0	0.4		1	1	1	1	1	Dicot	Annual forb
Hesperolinon serpentinum	Linaceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b		1				Dicot	Annual forb
Hesperolinon spergulinum	Linaceae	BE	4.7	14	3	6.0	2.3	1.3			1	1			Dicot	Annual forb
Hesperolinon tehamense	Linaceae	SE	5.8	34.5	6	6.0	0.8	0.3	1b		1				Dicot	Annual forb
Linum lewisii	Linaceae	WI/IN	1.3	4	3	1.0	1.5	0.9		1	1	1	1	1	Dicot	Perennial forb
Sidalcea diploscypha	Malvaceae	SI	2.6	13	5	3.0	2.3	1.0			1	1	1	1	Dicot	Annual forb
Sidalcea hartwegii	Malvaceae	WI	1.6	4.75	3	2.0	0.7	0.4			1			1	Dicot	Annual forb
Sidalcea hickmanii ssp. *anomala*	Malvaceae	SE	5.6	22.5	4	6.0	1.0	0.5	1b				1		Dicot	Perennial forb
Sidalcea hickmanii ssp. *viridis*	Malvaceae	SE	6.3	12.5	2	6.0	0.0	0.0	1b		1	1			Dicot	Perennial forb
Sidalcea keckii	Malvaceae	SI	3.0	6	2	3.0	2.8	2.0	1b					1	Dicot	Annual forb
Camissonia benitensis	Onagraceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b				1		Dicot	Annual forb
Camissonia lacustris	Onagraceae	SI	3.0	9	3	3.0	3.0	1.7			1			1	Dicot	Annual forb
Clarkia arcuata	Onagraceae	WI	2.3	7	3	2.0	0.6	0.3						1	Dicot	Annual forb
Clarkia biloba ssp. *biloba*	Onagraceae	WI/IN	1.4	2.75	2	1.4	0.9	0.6				1		1	Dicot	Annual forb
Clarkia breweri	Onagraceae	BE/SI	3.8	11.5	3	3.0	2.1	1.2	4			1	1		Dicot	Annual forb
Clarkia franciscana	Onagraceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b			1	1		Dicot	Annual forb
Clarkia gracilis ssp. *albicaulis*	Onagraceae	WI	2.2	6.5	3	2.0	1.0	0.6	1b					1	Dicot	Annual forb
Clarkia gracilis ssp. *tracyi*	Onagraceae	BE	5.0	25	5	5.0	1.0	0.4	4		1				Dicot	Annual forb
Epilobium minutum	Onagraceae	WI	2.0	6	3	2.0	1.0	0.6		1	1	1	1	1	Dicot	Annual forb
Epilobium oreganum	Onagraceae	BE/SI	3.8	23	6	4.0	2.2	0.9		1	1				Dicot	Perennial forb

Appendix 1. Continued.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Epilobium rigidum	Onagraceae	BE	5.1	20.5	4	6.0	2.0	1.0	4	1					Dicot	Perennial forb
Epilobium siskiyouense	Onagraceae	SE	5.5	38.5	7	6.0	1.0	0.4	1b	1					Dicot	Perennial forb
Cypripedium californicum	Orchidaceae	BE	4.5	40.5	9	4.0	1.3	0.4	4	1	1	1		1	Monocot	Perennial forb (bulb)
Cypripedium fasciculatum	Orchidaceae	SI	2.5	12.25	5	2.0	1.6	0.7	4	1	1	1		1	Monocot	Perennial forb (bulb)
Piperia candida	Orchidaceae	WI/IN	1.2	3.5	3	1.0	1.0	0.6	4	1	1	1			Monocot	Perennial forb (bulb)
Orobanche valida ssp. *howellii*	Orobanchaceae	SI	3.4	13.5	4	3.0	1.3	0.6	4		1				Dicot	Perennial forb (paras.)
Dicentra chrysantha	Papaveraceae	WI/IN	1.1	3.25	3	1.0	0.9	0.5		1	1	1	1	1	Dicot	Perennial forb
Dicentra formosa ssp. *oregana*	Papaveraceae	SE	5.6	22.5	4	6.0	1.0	0.5	4	1					Dicot	Perennial forb
Dicentra pauciflora	Papaveraceae	WI	2.2	6.5	3	3.0	1.4	0.8		1				1	Dicot	Perennial forb
Eschscholzia hypecoides	Papaveraceae	SI	2.6	7.75	3	1.0	3.1	1.8	4				1		Dicot	Annual forb
Platystemon californicus	Papaveraceae	WI	1.7	5	3	2.0	0.6	0.3		1	1	1	1	1	Dicot	Annual forb
Picea breweriana	Pinaceae	WI	2.2	6.5	3	3.0	1.4	0.8		1					Gymnosp.	Tree
Pinus attenuata	Pinaceae	SI	2.5	12.6	5	3.0	2.4	1.1		1	1	1	1	1	Gymnosp.	Tree
Pinus balfouriana ssp. *balfouriana*	Pinaceae	BE/SI	4.3	26	6	4.0	1.5	0.6		1					Gymnosp.	Tree
Pinus coulteri	Pinaceae	WI/IN	1.3	4	3	1.0	1.5	0.9				1	1		Gymnosp.	Tree
Pinus jeffreyi	Pinaceae	SI	2.7	8	3	3.0	0.6	0.3		1	1		1	1	Gymnosp.	Tree
Pinus sabiniana	Pinaceae	WI/IN	1.4	4.25	3	1.0	1.4	0.8		1	1	1	1	1	Gymnosp.	Tree
Plantago erecta	Plantaginaceae	WI/IN	1.0	3	3	1.0	1.0	0.6		1	1	1	1	1	Dicot	Annual forb
Achnatherum lemmonii var. *pubescens*	Poaceae	BE	4.8	14.5	3	6.0	2.3	1.3	3	1	1				Monocot	Perennial gram. (cesp.)
Achnatherum nelsonii var. *dorei*	Poaceae	WI/IN	1.0	2	2	1.0	1.4	1.0						1	Monocot	Perennial gram. (cesp.)
Achnatherum stillmanii	Poaceae	WI/IN	1.1	2.1	2	1.1	1.3	1.0						1	Monocot	Perennial gram. (cesp.)
Agrostis microphylla	Poaceae	WI/IN	1.1	4.25	4	1.1	1.1	0.5			1	1	1		Monocot	Annual gram.
Bromus laevipes	Poaceae	WI	1.7	65	3	2.0	0.6	0.3		1	1	1	1	1	Monocot	Perennial gram. (cesp.)
Calamagrostis foliosa	Poaceae	WI	1.7	5	3	2.0	1.5	0.9			1				Monocot	Perennial gram. (rhiz.)
Calamagrostis ophitidis	Poaceae	SE	6.1	24.5	4	6.0	0.0	0.0	4		1	1			Monocot	Perennial gram. (rhiz.)

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Calamagrostis stricta ssp. *inexpansa*	Poaceae	WI	1.5	3	2	1.5	2.1	1.5		1	1	1	1	1	Monocot	Perennial gram. (cesp.)
Danthonia californica var. *californica*	Poaceae	SI	3.3	13	4	3.0	2.2	1.1		1	1	1	1	1	Monocot	Perennial gram. (cesp.)
Elymus trachycaulus ssp. *trachycaulus*	Poaceae	WI	1.6	3.1	2	1.6	2.1	1.5		1	1	1	1	1	Monocot	Perennial gram. (cesp.)
Festuca californica	Poaceae	WI	2.4	11.75	5	2.0	1.6	0.7		1	1	1	1	1	Monocot	Perennial gram. (cesp.)
Festuca idahoensis	Poaceae	WI/IN	1.3	5.25	4	1.0	1.2	0.6		1	1	1	1	1	Monocot	Perennial gram. (cesp.)
Hordeum brachyantherum ssp. *californicum*	Poaceae	SI	3.1	9.25	3	3.0	2.9	1.7		1	1	1	1	1	Monocot	Perennial gram. (cesp.)
Melica geyeri	Poaceae	WI/IN	1.2	6	5	1.0	0.4	0.2		1	1		1	1	Monocot	Perennial gram. (cesp.)
Poa piperi	Poaceae	BE	5.4	21.5	4	5.5	1.0	0.5	4	1					Monocot	Perennial gram. (rhiz.)
Poa rhizomata	Poaceae	WI	1.8	3.5	2	1.5	2.1	1.5	4	1					Monocot	Perennial gram. (rhiz.)
Poa tenerrima	Poaceae	SI	3.3	13	4	3.0	1.3	0.6				1	1	1	Monocot	Perennial gram. (cesp.)
Scribneria bolanderi	Poaceae	WI	1.7	5.1	3	1.0	2.0	1.2		1	1	1	1	1	Monocot	Annual gram.
Vulpia microstachys var. *microstachys*	Poaceae	WI	2.3	9.1	4	2.0	2.0	1.0		1	1	1	1	1	Monocot	Annual gram.
Collomia diversifolia	Polemoniaceae	SE	5.6	33.5	6	6.0	1.2	0.5	4		1	1			Dicot	Annual forb
Collomia tinctoria	Polemoniaceae	WI	1.8	7.1	4	2.0	1.5	0.7		1	1			1	Dicot	Annual forb
Gilia capitata ssp. *capitata*	Polemoniaceae	WI	1.6	4.75	3	1.0	1.2	0.7		1	1				Dicot	Annual, Perennial forb
Gilia sinistra ssp. *pinnatisecta*	Polemoniaceae	BE/SI	3.8	19	5	3.0	2.2	1.0	4		1				Dicot	Annual, Perennial forb

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Gilia sinistra ssp. *sinistra*	Polemoniaceae	SI	2.5	7.5	3	3.0	1.8	1.0		1	1			1	Dicot	Annual forb
Linanthus ambiguus	Polemoniaceae	SE	5.8	17.5	3	6.0	0.6	0.3	4			1	1		Dicot	Annual forb
Linanthus bolanderi	Polemoniaceae	WI/IN	1.3	2.5	2	1.3	1.1	0.8			1	1		1	Dicot	Annual forb
Linanthus dichotomus	Polemoniaceae	SI	2.5	12.35	5	3.0	2.4	1.1		1	1	1	1	1	Dicot	Annual forb
Linanthus latisectus (= *Leptosiphon la.*)	Polemoniaceae	WI	2.0	6	3	2.0	0.0	0.0			1				Dicot	Annual forb
Linanthus liniflorus (= *Leptosiphon li.*)	Polemoniaceae	WI	1.6	6.25	4	1.5	1.2	0.6		1	1	1	1	1	Dicot	Annual forb
Linanthus nuttallii ssp. *howellii* (= *Leptosiphon n. s. h.*)	Polemoniaceae	BE	5.3	31.5	6	6.0	1.3	0.5	1b		1				Dicot	Perennial forb
Navarretia heterodoxa	Polemoniaceae	SI	2.8	14	5	3.0	2.4	1.1				1			Dicot	Annual forb
Navarretia jaredii	Polemoniaceae	SE	5.9	23.5	4	6.0	0.5	0.3	4				1		Dicot	Annual forb
Navarretia jepsonii	Polemoniaceae	SE	5.6	22.5	4	5.5	0.6	0.3	4		1				Dicot	Annual forb
Navarretia pubescens	Polemoniaceae	WI	2.0	6	3	2.0	1.0	0.6			1	1	1	1	Dicot	Annual forb
Navarretia rosulata	Polemoniaceae	SE	6.0	18	3	6.0	0.0	0.0	1b		1	1			Dicot	Annual forb
Phlox hirsuta	Polemoniaceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b	1					Dicot	Perennial forb
Polemonium chartaceum	Polemoniaceae	WI	1.6	8.1	5	2.0	1.5	0.7	1b	1				1	Dicot	Perennial forb
Polygala cornuta var. *cornuta*	Polygalaceae	WI	2.3	9	4	2.0	1.3	0.6		1				1	Dicot	Perennial forb, Shrub
Chorizanthe breweri	Polygonaceae	BE	5.4	21.5	4	5.5	1.0	0.5	1b				1		Dicot	Annual forb
Chorizanthe palmeri	Polygonaceae	BE	4.9	24.5	5	6.0	1.6	0.7	4				1		Dicot	Annual forb
Chorizanthe uniaristata	Polygonaceae	SI	2.7	10.75	4	2.5	2.0	1.0					1	1	Dicot	Annual, Perennial forb
Chorizanthe ventricosa	Polygonaceae	BE	5.3	16	3	6.0	1.2	0.7	4				1		Dicot	Annual forb
Eriogonum alpinum	Polygonaceae	SE	6.1	30.5	5	6.0	0.0	0.0	1b	1					Dicot	Perennial forb
Eriogonum argillosum	Polygonaceae	SI	3.1	12.5	4	3.0	2.6	1.3	4			1	1		Dicot	Annual forb
Eriogonum compositum var. *compositum*	Polygonaceae	WI	1.7	5.1	3	2.0	1.5	0.9		1	1				Dicot	Perennial forb
Eriogonum congdonii	Polygonaceae	BE	5.1	35.5	7	6.0	1.7	0.7	4	1					Dicot	Shrub
Eriogonum covilleanum	Polygonaceae	SI	3.0	12	4	3.0	1.6	0.8					1		Dicot	Annual forb
Eriogonum dasyanthemum	Polygonaceae	SI	3.0	6	2	3.0	1.4	1.0			1				Dicot	Annual forb
Eriogonum diclinum	Polygonaceae	SI	3.2	9.5	3	3.0	3.0	1.7	4	1					Dicot	Perennial forb
Eriogonum elatum var. *villosum*	Polygonaceae	SI	3.3	13	4	3.5	3.2	1.6		1				1	Dicot	Perennial forb
Eriogonum hirtellum	Polygonaceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b	1					Dicot	Perennial forb (rhiz.)
Eriogonum hirtiflorum	Polygonaceae	SI	3.3	13	4	3.5	3.2	1.6		1	1	1	1	1	Dicot	Annual forb
Eriogonum kelloggii	Polygonaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b		1				Dicot	Perennial forb
Eriogonum libertini	Polygonaceae	SE	6.1	36.5	6	6.0	0.0	0.0	4	1	1				Dicot	Perennial forb
Eriogonum luteolum var. *caninum*	Polygonaceae	SE	5.5	27.5	5	6.0	0.9	0.4	3		1	1			Dicot	Annual forb

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Eriogonum luteolum var. *luteolum*	Polygonaceae	BE/SI	3.8	15	4	3.0	1.5	0.8		1	1	1		1	Dicot	Annual forb
Eriogonum nervulosum	Polygonaceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b		1				Dicot	Perennial forb (rhiz.)
Eriogonum nudum var. *indictum*	Polygonaceae	WI	1.5	4.5	3	1.0	0.6	0.3	4				1		Dicot	Perennial forb
Eriogonum nudum var. *oblongifolium*	Polygonaceae	WI	2.0	6	3	2.0	0.0	0.0		1	1			1	Dicot	Perennial forb
Eriogonum pendulum	Polygonaceae	SE	6.2	18.5	3	6.0	0.0	0.0	2	1					Dicot	Perennial forb
Eriogonum pyrolifolium	Polygonaceae	WI/IN	1.0	3	3	0.0	1.7	1.0		1				1	Dicot	Perennial forb
Eriogonum siskiyouense	Polygonaceae	BE	5.4	32.5	6	6.0	1.2	0.5	4	1					Dicot	Perennial forb
Eriogonum strictum var. *greenei*	Polygonaceae	SE	5.9	29.5	5	6.0	0.4	0.2	4	1	1				Dicot	Perennial forb
Eriogonum strictum var. *proliferum*	Polygonaceae	SE	6.0	24	4	6.0	0.0	0.0		1	1			1	Dicot	Perennial forb
Eriogonum teretum	Polygonaceae	SE	6.2	18.5	3	6.0	0.0	0.0	4	1	1				Dicot	Perennial forb
Eriogonum trichopes var. *hooveri*	Polygonaceae	SI	3.3	10	3	3.0	2.5	1.5					1		Dicot	Annual forb
Eriogonum tripodum	Polygonaceae	BE	5.3	26.5	5	6.0	1.3	0.6	4		1			1	Dicot	Shrub
Eriogonum umbellatum var. *argus*	Polygonaceae	SI	3.0	12	4	3.5	1.4	0.7		1	1				Dicot	Perennial forb
Eriogonum umbellatum var. *bahiiforme*	Polygonaceae	BE/SI	3.5	21	6	3.0	1.2	0.5	4		1	1	1		Dicot	Perennial forb
Eriogonum umbellatum var. *goodmanii*	Polygonaceae	SI	3.3	10	3	3.0	2.5	1.5		1					Dicot	Perennial forb
Eriogonum umbellatum var. *humistratum*	Polygonaceae	BE	4.5	27.25	6	5.0	2.1	0.8	4	1	1				Dicot	Perennial forb
Eriogonum umbellatum var. *speciosum*	Polygonaceae	BE/SI	4.2	21	5	4.0	1.3	0.6		1				1	Dicot	Perennial forb
Eriogonum ursinum	Polygonaceae	WI/IN	1.1	2.25	2	1.1	1.2	0.9		1				1	Dicot	Perennial forb
Eriogonum vimineum	Polygonaceae	WI/IN	1.0	3	3	1.0	0.0	0.0		1				1	Dicot	Annual forb
Polygonum douglasii ssp. *majus*	Polygonaceae	WI	1.5	4.5	3	2.0	0.9	0.5		1				1	Dicot	Annual forb
Polygonum douglasii ssp. *spergulariiforme*	Polygonaceae	SI	3.0	18.25	6	2.5	2.1	0.9		1	1	1		1	Dicot	Annual forb
Systenotheca vortriedei	Polygonaceae	SI	3.1	12.25	4	2.5	2.2	1.1	4				1		Dicot	Annual forb
Calyptridium quadripetalum	Portulacaceae	BE	4.6	27.5	6	4.0	1.2	0.5	4		1				Dicot	Annual forb
Calyptridium umbellatum	Portulacaceae	WI/IN	1.3	4	3	1.0	1.5	0.9		1	1	1		1	Dicot	Perennial forb
Claytonia exigua ssp. *exigua*	Portulacaceae	SI	3.4	24	7	3.0	1.1	0.4		1	1	1	1	1	Dicot	Annual forb
Claytonia exigua ssp. *glauca*	Portulacaceae	BE/SI	3.6	18	5	3.0	1.3	0.6		1	1	1	1		Dicot	Annual forb
Claytonia gypsophiloides	Portulacaceae	SI	3.1	15.5	5	3.0	0.2	0.1			1	1	1		Dicot	Annual forb

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Claytonia saxosa	Portulacaceae	BE/SI	4.4	21.75	5	5.0	2.2	1.0		1	1				Dicot	Annual forb
Lewisia cantelovii	Portulacaceae	WI/IN	1.0	6	6	1.0	1.1	0.4	1b	1				1	Dicot	Perennial forb
Lewisia cotyledon var. *cotyledon*	Portulacaceae	WI	2.0	6	3	3.0	1.7	1.0		1					Dicot	Perennial forb
Lewisia cotyledon var. *heckneri*	Portulacaceae	WI/IN	1.0	4	4	0.5	1.4	0.7		1					Dicot	Perennial forb
Lewisia cotyledon var. *howellii*	Portulacaceae	WI/IN	1.3	4	3	1.0	1.5	0.9		1					Dicot	Perennial forb
Lewisia leana	Portulacaceae	SI	3.0	6	2	3.0	0.0	0.0		1	1			1	Dicot	Perennial forb
Lewisia nevadensis	Portulacaceae	WI	1.7	5	3	2.0	1.5	0.9		1	1			1	Dicot	Perennial forb
Lewisia oppositifolia	Portulacaceae	BE	5.3	21	4	6.0	1.5	0.8		1					Dicot	Perennial forb
Lewisia rediviva	Portulacaceae	WI/IN	1.4	7	5	1.0	1.1	0.5		1	1	1	1	1	Dicot	Perennial forb
Lewisia stebbinsii	Portulacaceae	BE	4.7	14	3	6.0	2.3	1.3	1b		1				Dicot	Perennial forb
Lewisia triphylla	Portulacaceae	WI	1.7	5	3	2.0	1.5	0.9		1	1			1	Dicot	Perennial forb
Dodecatheon clevelandii ssp. *patulum*	Primulaceae	SI	3.0	9	3	3.0	0.0	0.0				1	1	1	Dicot	Perennial forb
Adiantum aleuticum	Pteridaceae	WI	2.4	11.75	5	2.0	1.2	0.5		1	1	1	1	1	Pteridoph.	Perennial forb
Aspidotis carlotta-halliae	Pteridaceae	BE	5.3	26.5	5	6.0	1.1	0.5	4			1	1		Pteridoph.	Perennial forb (rhiz.)
Aspidotis densa	Pteridaceae	SI	3.4	31	9	3.0	1.2	0.4		1	1	1	1	1	Pteridoph.	Perennial forb
Pellaea brachyptera	Pteridaceae	WI	1.5	4.5	3	2.0	0.9	0.5		1	1			1	Pteridoph.	Perennial forb
Anemone drummondii	Ranunculaceae	WI	2.3	6.75	3	2.0	1.6	0.9		1				1	Dicot	Perennial forb
Aquilegia eximia	Ranunculaceae	BE/SI	4.2	25	6	3.5	1.5	0.6			1	1	1		Dicot	Perennial forb
Delphinium hesperium ssp. *hesperium*	Ranunculaceae	SI	2.7	8	3	3.0	0.6	0.3		1	1	1			Dicot	Perennial forb
Delphinium nuttallianum	Ranunculaceae	WI/IN	1.4	4.1	3	1.0	1.5	0.9		1				1	Dicot	Perennial forb
Delphinium parryi ssp. *eastwoodiae*	Ranunculaceae	BE/SI	3.7	11	3	4.0	2.5	1.5					1		Dicot	Perennial forb
Delphinium uliginosum	Ranunculaceae	SE	5.7	28.5	5	6.0	0.9	0.4	4		1				Dicot	Perennial forb
Ceanothus confusus	Rhamnaceae	WI/IN	1.3	2.5	2	1.3	1.1	0.8	1b		1				Dicot	Shrub
Ceanothus cuneatus var. *cuneatus*	Rhamnaceae	WI	1.5	6.1	4	1.5	1.3	0.6		1	1	1	1	1	Dicot	Shrub
Ceanothus divergens	Rhamnaceae	WI	2.0	4	2	2.0	1.4	1.0	1b		1				Dicot	Shrub
Ceanothus ferrisae	Rhamnaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b			1			Dicot	Shrub
Ceanothus foliosus var. *medius*	Rhamnaceae	BE/SI	4.0	12	3	3.0	1.7	1.0				1	1		Dicot	Shrub
Ceanothus jepsonii	Rhamnaceae	SE	6.0	18	3	6.0	0.0	0.0			1	1			Dicot	Shrub
Ceanothus masonii	Rhamnaceae	SI	3.3	6.5	2	3.0	4.2	3.0	1b			1			Dicot	Shrub
Ceanothus papillosus var. *roweanus*	Rhamnaceae	WI	1.5	3	2	1.5	2.1	1.5					1		Dicot	Shrub
Ceanothus pumilus	Rhamnaceae	SE	5.7	28.5	5	6.0	0.9	0.4		1	1				Dicot	Shrub
Ceanothus roderickii	Rhamnaceae	WI	1.7	5	3	2.0	1.5	0.9	1b					1	Dicot	Shrub
Ceanothus sonomensis	Rhamnaceae	WI/IN	1.3	4	3	2.0	1.2	0.7	1b			1			Dicot	Shrub

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Rhamnus californica ssp. *occidentalis*	Rhamnaceae	SE	6.0	24	4	6.0	0.0	0.0		1	1			1	Dicot	Shrub
Rhamnus tomentella ssp. *crassifolia*	Rhamnaceae	BE	4.8	19	4	6.0	2.5	1.3		1	1				Dicot	Shrub
Rhamnus tomentella ssp. *tomentella*	Rhamnaceae	WI	1.5	6	4	0.8	1.7	0.8		1	1	1	1	1	Dicot	Shrub
Adenostoma fasciculatum	Rosaceae	WI/IN	1.3	5.2	4	1.1	1.4	0.7			1	1	1	1	Dicot	Shrub
Holodiscus discolor	Rosaceae	WI/IN	1.0	3	3	1.0	1.0	0.6		1	1	1	1	1	Dicot	Shrub
Horkelia congesta ssp. *nemorosa*	Rosaceae	BE/SI	3.8	7.5	2	3.5	0.7	0.5	2	1					Dicot	Perennial forb
Horkelia daucifolia	Rosaceae	BE/SI	3.8	15	4	3.0	1.5	0.8		1	1				Dicot	Perennial forb
Horkelia sericata	Rosaceae	SE	5.6	22.5	4	6.0	1.0	0.5	4	1					Dicot	Perennial forb
Horkelia tridentata ssp. *flavescens*	Rosaceae	SI	3.0	9	3	2.0	1.7	1.0		1	1			1	Dicot	Perennial forb
Ivesia gordonii	Rosaceae	WI	1.6	3.25	2	1.6	1.9	1.4		1	1			1	Dicot	Perennial forb
Ivesia pickeringii	Rosaceae	BE	5.4	32.5	6	6.0	1.0	0.4	1b	1					Dicot	Perennial forb
Potentilla cristae	Rosaceae	SI	3.1	12.5	4	3.0	0.0	0.0	1b	1					Dicot	Perennial forb
Sanguisorba officinalis	Rosaceae	BE/SI	4.2	12.5	3	3.0	1.7	1.0	2	1	1				Dicot	Perennial forb (rhiz.)
Galium ambiguum var. *ambiguum*	Rubiaceae	SI	3.3	10	3	3.0	2.5	1.5			1			1	Dicot	Perennial forb
Galium ambiguum var. *siskiyouense*	Rubiaceae	SE	5.5	27.5	5	6.0	0.9	0.4		1	1				Dicot	Perennial forb
Galium andrewsii ssp. *andrewsii*	Rubiaceae	SI	3.2	16	5	3.0	1.9	0.9			1	1	1		Dicot	Perennial forb
Galium andrewsii ssp. *gatense*	Rubiaceae	BE	5.1	20.5	4	5.0	0.8	0.4	4			1	1		Dicot	Perennial forb
Galium andrewsii ssp. *intermedium*	Rubiaceae	WI/IN	1.4	2.75	2	1.4	0.9	0.6					1		Dicot	Perennial forb
Galium clementis	Rubiaceae	WI/IN	1.0	2	2	1.0	1.4	1.0	1b				1		Dicot	Perennial forb
Galium hardhamiae	Rubiaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b				1		Dicot	Perennial forb
Galium serpenticum ssp. *scotticum*	Rubiaceae	SE	5.9	29.5	5	6.0	0.4	0.2	1b	1					Dicot	Perennial forb
Salix breweri	Salicaceae	SE	6.0	30	5	6.0	0.0	0.0			1	1	1		Dicot	Shrub
Salix delnortensis	Salicaceae	SE	6.2	18.5	3	6.0	0.0	0.0	4	1					Dicot	Shrub
Salix sitchensis	Salicaceae	WI	1.6	4.75	3	1.0	1.2	0.7		1	1	1	1		Dicot	Tree, shrub
Darlingtonia californica	Sarraceniaceae	BE/SI	4.1	32.5	8	4.0	1.4	0.5	4	1				1	Dicot	Perennial forb (carn.)
Parnassia californica	Saxifragaceae	WI	2.0	6	3	2.0	0.0	0.0		1	1		1	1	Dicot	Perennial forb
Saxifraga howellii	Saxifragaceae	BE/SI	3.8	7.5	2	3.5	2.1	1.5	4	1					Dicot	Perennial forb
Antirrhinum cornutum	Scrophulariaceae	WI	2.2	11	5	2.0	0.8	0.4			1				Dicot	Annual forb
Antirrhinum leptaleum	Scrophulariaceae	WI	1.6	3.1	2	1.6	2.1	1.5						1	Dicot	Annual forb

Appendix 1. Continued.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Antirrhinum subcordatum	Scrophulariaceae	BE/SI	4.3	21.5	5	4.0	1.8	0.8	4		1				Dicot	Annual forb
Antirrhinum vexillo-calyculatum	Scrophulariaceae	SI	2.5	20	8	2.5	1.3	0.5		1	1	1	1	1	Dicot	Annual forb
Antirrhinum virga	Scrophulariaceae	SI	2.8	8.5	3	3.0	0.6	0.3	4		1				Dicot	Perennial forb
Castilleja affinis ssp. *neglecta*	Scrophulariaceae	SE	6.1	30.5	5	6.0	0.0	0.0	1b		1	1			Dicot	Perennial forb (hemipar.)
Castilleja foliolosa	Scrophulariaceae	WI	2.3	9	4	2.5	1.0	0.5			1	1	1	1	Dicot	Perennial forb, Shrub
Castilleja hispida ssp. *brevilobata*	Scrophulariaceae	SE	6.2	18.5	3	6.0	0.0	0.0	4	1					Dicot	Perennial forb (hemipar.)
Castilleja miniata ssp. *elata*	Scrophulariaceae	BE	4.6	27.5	6	4.5	1.4	0.6	2	1					Dicot	Perennial forb (hemipar.)
Castilleja minor ssp. *spiralis*	Scrophulariaceae	SI	3.3	16.5	5	3.0	2.6	1.2			1	1	1	1	Dicot	Annual forb (hemipar.)
Castilleja pruinosa	Scrophulariaceae	SI	3.2	15.75	5	3.0	1.9	0.8		1	1			1	Dicot	Perennial forb (hemipar.)
Castilleja rubicundula ssp. *lithospermoides*	Scrophulariaceae	WI	2.4	9.75	4	2.0	1.8	0.9			1				Dicot	Annual forb (hemipar.)
Castilleja rubicundula ssp. *rubicundula*	Scrophulariaceae	SE	5.6	28	5	6.0	0.9	0.4	1b		1				Dicot	Annual forb (hemipar.)
Collinsia greenei	Scrophulariaceae	BE	5.2	31	6	6.0	1.3	0.5		1	1				Dicot	Annual forb
Collinsia multicolor	Scrophulariaceae	WI/IN	1.1	2.25	2	1.1	1.2	0.9	1b		1	1			Dicot	Annual forb
Collinsia sparsiflora	Scrophulariaceae	WI	1.7	5	3	1.0	1.2	0.7		1	1	1	1	1	Dicot	Annual forb
Cordylanthus nidularius	Scrophulariaceae	SE	6.2	18.5	3	6.0	0.0	0.0	1b			1	1		Dicot	Annual forb (hemipar.)
Cordylanthus pilosus var. *pilosus*	Scrophulariaceae	SI	2.5	10	4	2.5	0.6	0.3			1	1			Dicot	Annual forb (hemipar.)
Cordylanthus pringlei	Scrophulariaceae	SE	5.6	28	5	6.0	0.9	0.4			1				Dicot	Annual forb (hemipar.)
Cordylanthus tenuis ssp. *brunneus*	Scrophulariaceae	BE	5.1	25.5	5	5.0	1.0	0.4	4		1				Dicot	Annual forb (hemipar.)
Cordylanthus tenuis ssp. *capillaris*	Scrophulariaceae	SE	6.1	24.5	4	6.0	0.0	0.0	1b		1				Dicot	Annual forb (hemipar.)
Cordylanthus tenuis ssp. *tenuis*	Scrophulariaceae	WI	2.3	9	4	2.0	0.5	0.3						1	Dicot	Annual forb (hemipar.)
Cordylanthus tenuis ssp. *viscidus*	Scrophulariaceae	BE	4.5	27	6	4.5	1.4	0.6		1	1			1	Dicot	Annual forb (hemipar.)
Keckiella lemmonii	Scrophulariaceae	WI/IN	1.1	3.25	3	1.0	0.9	0.5		1	1			1	Dicot	Shrub
Mimulus douglasii	Scrophulariaceae	SI	2.7	13.5	5	3.0	0.5	0.2		1	1	1	1	1	Dicot	Annual forb
Mimulus glaucescens	Scrophulariaceae	BE/SI	3.8	18.75	5	4.0	2.1	0.9	4					1	Dicot	Annual forb
Mimulus layneae (including *M. brachiatus*)	Scrophulariaceae	SI	2.9	14.25	5	3.0	1.2	0.5		1	1			1	Dicot	Annual forb

APPENDIX 1. CONTINUED.

Taxon[1]	Family	Aff[2]	Mean[3]	Sum[4]	Sources	Med.[5]	SD[6]	SE[7]	Rarity[8]	Geog. Dist.[9] KL	NC	BA	SC	SN	Tax. Cat.[10]	Lifeform[11]
Mimulus nudatus	Scrophulariaceae	SE	5.6	33.5	6	6.0	1.2	0.5	4		1				Dicot	Annual forb
Mimulus primuloides ssp. *linearifolius*	Scrophulariaceae	BE/SI	4.0	16	4	4.5	2.4	1.2		1					Dicot	Perennial forb (rhiz.)
Orthocarpus pachystachyus	Scrophulariaceae	SE	6.0	18	3	6.0	0.0	0.0		1					Dicot	Annual forb (hemipar.)
Pedicularis howellii	Scrophulariaceae	SI	2.5	7.5	3	3.0	1.2	0.7	4	1					Dicot	Perennial forb (hemipar.)
Penstemon azureus var. *azureus*	Scrophulariaceae	SI	2.7	8	3	3.0	0.6	0.3		1	1			1	Dicot	Perennial forb
Penstemon filiformis	Scrophulariaceae	BE	5.0	30	6	5.5	1.3	0.5		1					Dicot	Perennial forb
Penstemon parvulus	Scrophulariaceae	BE/SI	3.7	11	3	4.0	0.6	0.3		1				1	Dicot	Perennial forb
Penstemon purpusii	Scrophulariaceae	SI	2.8	11	4	2.0	2.4	1.2		1	1				Dicot	Perennial forb
Triphysaria floribunda	Scrophulariaceae	WI	2.3	6.75	3	2.0	1.9	1.1	1b		1	1	1		Dicot	Annual forb
Veronica copelandii	Scrophulariaceae	SE	6.1	24.5	4	6.0	0.0	0.0	4	1					Dicot	Perennial forb
Fremontodendron californicum ssp. *decumbens*	Sterculiaceae	BE/SI	2.0	8	4	1.5	2.4	1.2	1b					1	Dicot	Shrub
Verbena californica	Verbenaceae	BE	4.8	14.5	3	4.0	1.2	0.7	1b					1	Dicot	Perennial forb
Viola cuneata	Violaceae	BE	5.2	31	6	6.0	1.3	0.5		1	1				Dicot	Perennial forb
Viola douglasii	Violaceae	SI	2.8	13.75	5	2.0	2.0	0.9		1	1	1	1	1	Dicot	Perennial forb
Viola hallii	Violaceae	BE/SI	4.0	16	4	4.0	2.3	1.2		1	1				Dicot	Perennial forb
Viola lobata ssp. *lobata*	Violaceae	WI	2.3	11.35	5	2.0	2.4	1.1		1	1			1	Dicot	Perennial forb (rhiz.)
Viola ocellata	Violaceae	SI	2.5	12.5	5	3.0	0.9	0.4		1	1	1	1		Dicot	Perennial forb
Viola primulifolia ssp. *occidentalis*	Violaceae	BE	5.1	25.5	5	6.0	1.4	0.6	1b	1					Dicot	Perennial forb (rhiz.)
Viola purpurea ssp. *integrifolia*	Violaceae	WI/IN	1.3	4	3	2.0	1.2	0.7		1	1			1	Dicot	Perennial forb